The Magazine of the Registered Professional Engineer

American Engineer

SEPTEMBER 1959

The Great Debate:

Should We Adopt The Metric System?

See page 23

—Water—

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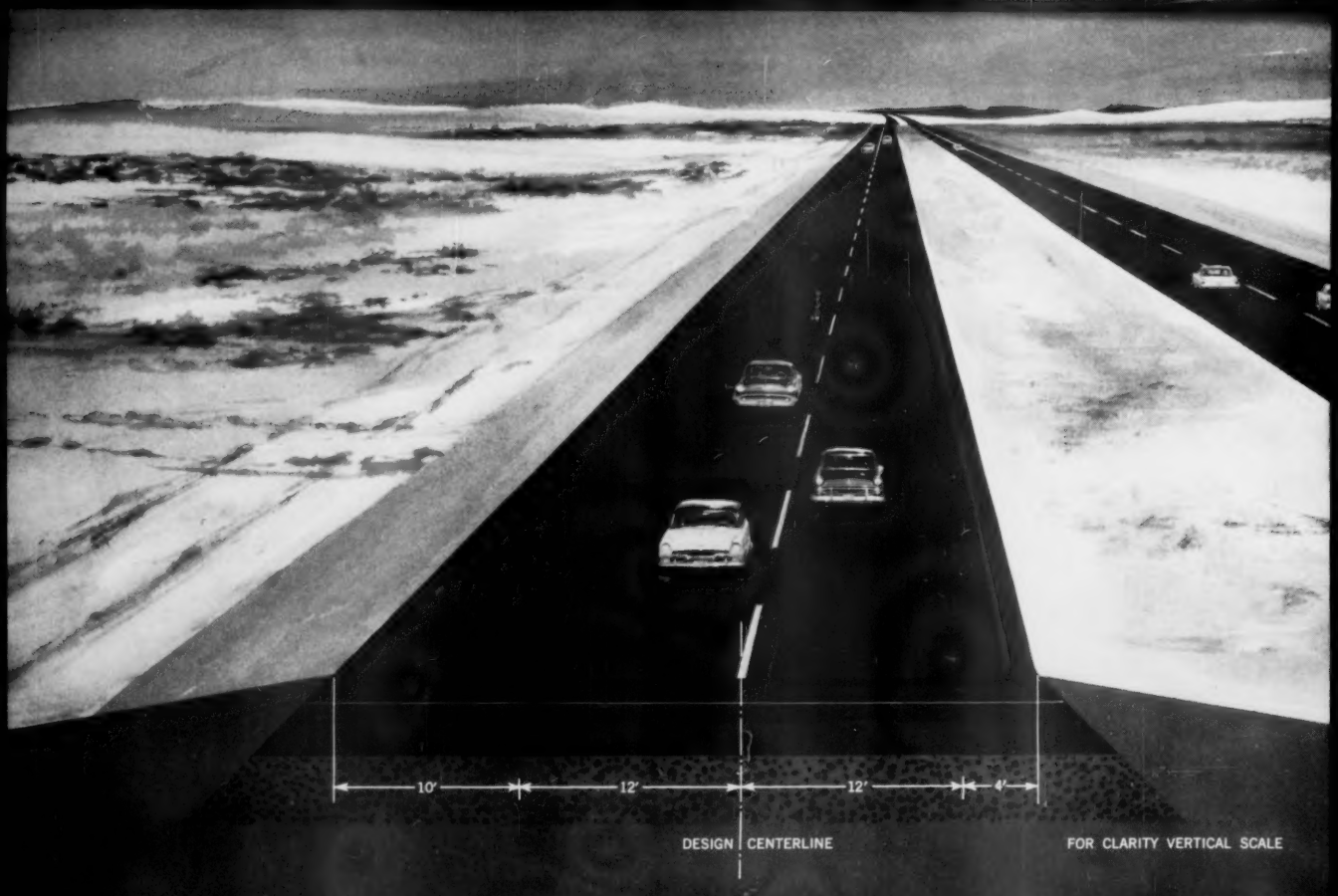
—Special Insert—

Exclusive Reports for the Engineer In Government and Private Practice



Arizona's First Interstate

Experience with veteran 2-lane Asphalt

Arizona is a big state with a low population density—which means it needs plenty of roads. But there aren't millions of Arizonans to pay for them. Every dollar counts.

These are some of the reasons why most of Arizona's roads traditionally have been of economical Asphalt construction. Time and again, since the State began to pave, Asphalt pavements have stretched available funds over more and more of these long Arizona miles than could any other pavement type.

Now, along with the rest of the states, Arizona has launched a vast new road-building program. And even though more federal aid is available than ever before, these roads, too, are turning out to be Asphalt-paved. You don't have to look far for the reasons.

Arizona's veteran Asphalt-paved highways have proved themselves as rugged and durable as they were economical to build and maintain.

U.S. Route 66 between Winslow and Holbrook is an example. First paved more than 25 years ago (with Asphalt and sand!), this pavement is successfully supporting heavy traffic undreamed of when it was first built. "Double" trucks by the dozen barrel over it at 60 MPH. So does the bulk of Arizona's east-west traffic.

Now this veteran main artery, still in the prime of its life, is being given local traffic responsibilities. A new divided Interstate Highway (Route 40), carrying through traffic, will parallel it. The initial section of Arizona's new Interstate 40 is shown above. It is a 5.6 mile stretch between Winslow and Holbrook.

With no aggregate larger than ¾ inch available (and most under ¼ inch), only Asphalt construction could have been used to build this section of pavement up to Interstate standards. Total cost of the pavement structure was $1.75 per square yard!

½" WEARING COURSE
1½" ASPHALT PLANT MIX LEVELING COURSE
6" ASPHALT CURB
THE "WAFFLING" INTERLOCKS COURSES
1½" ASPHALT PLANT MIX BINDER COURSE
3" ASPHALT STABILIZED BASE (RC3)
VARIABLE 6" TO 15" SELECTED SUB-BASE
OF PAVEMENT IS EXAGGERATED
SUB-SOIL

Segment Asphalt-Paved!

pavements leads to decision

The cross section above shows you in detail how low-cost Asphalt materials were used to give this pavement lasting strength despite the scarcity of aggregate.

Notice, first, the use of Asphalt in the 3-inch base. This base, a sandy gravel, was road-mixed on the selected sub-base using RC-3 liquid asphalt.

Notice, second, (see right roadway above) that the 3-inch leveling course was asphalt plant-mix laid down in two courses. A novel between-course inter-lock was provided by "waffling" the lower course while still hot with a 4-inch square grid pattern, impressed about ⅜-inch into the surface. A tack coat was applied and a second course constructed. Then, a ½-inch wearing course was laid to insure a non-skid surface.

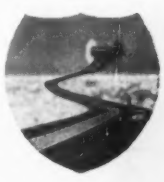
Notice, third, that both base and surface courses are uniform across the whole width of the road, shoulders as well as traffic lanes.

Notice, fourth, the use of Asphalt curb to provide controlled drainage, prevent embankment erosion and aid safety.

BEAT SCHEDULE BY TEN WEEKS

With today's equipment, modern heavy-duty Asphalt concrete pavement is being laid at record, reputation-building, tax-fund-conserving speeds. In this case, construction was completed 10 weeks ahead of schedule . . . in plenty of time to accommodate the bulk of the summer tourist traffic.

Modern Asphalt concrete pavement can help **you** speed your highway modernizing program. It provides, as well, strength, durability and economy in full measure. Specify it for your Interstate Highways. Primary and farm-to-market roads, too.



Ribbons of velvet smoothness . . .
***ASPHALT**-paved Interstate Highways*

THE ASPHALT INSTITUTE
Asphalt Institute Building, College Park, Maryland

Letters to the Editor

AE on Capitol Hill . . .

Dear Editor:

Thank you for . . . the article from the August, 1959, AMERICAN ENGINEER entitled "U.S. Engineers View Soviet Exhibition."

I took the liberty of bringing this fine evaluation of the Soviet Exhibition in New York to the attention of my colleagues in the Senate (via the *Congressional Record*), and am enclosing tear sheets containing the article and my brief remarks herewith. . . .

ALEXANDER WILEY
U.S. Senator from
Wisconsin

Aid the Soviets?

Dear Editor:

I was pleased to read in the August issue of AMERICAN ENGINEER the article, "U.S. Engineers View Soviet Exhibition," which indicated that our engineers saw through the exhibit as strictly a "sales pitch" or propaganda for the advancement of world Communism.

It is common knowledge that Communist Russia remained weak and despised until it was recognized in the U.S. in 1933, when our industrial might was opened to their espionage apparatus. Lt. Gen. Arthur G. Trudeau, chief of research and development for the Army, brought this out recently in an address when he said, "I say without fear of contradiction, that the advanced state of Soviet technology today is due more to Soviet success in espionage and subversion than it is to their scientific apparatus, good as it is . . ."

A knowledge of the Communist objective and perfidy was largely responsible for the resignation en masse recently of the American Society of Tool Engineers Standards Committee on T-Slot Spacing. They took this action when they learned that their work was to be channeled to the Communists through the American Standards Association and the International Organization for Standardization, an act which would be in direct violation of their Society's Code of Ethics. The "former" Committee believes that such standards activity should be restricted to morally strong anti-Communist nations.

George Washington, that outstanding engineer and statesman, put it quite succinctly when he said, "Associate with men of good quality, if you esteem your reputation; it is better to be alone than in bad company."

C. E. BIERWIRTH, P.E.
"Former" Chairman of the
ASTE Standards Committee on
T-Slot Spacing, Flint, Mich.

P.E. in Dictionary . . .

Dear Editor:

In our striving for widespread professional recognition, it seems to me that definitions are of importance.

The 1958 edition of *Webster's New Collegiate Dictionary* contains the following entry in the abbreviations section:

P.E., Presiding Elder; probable error (Statistics); Protestant Episcopal.

Judging from some of the obscure abbreviations which are listed, it seems that "Professional Engineer" certainly should be included. I'm sure not all of us fall into the presently listed categories!

Perhaps the NSPE can convince the G&C Merriam Co. that we're here to stay.

EARL K. DILLE, P.E.
St. Louis, Mo.

Action Needed . . .

Dear Editor:

Congratulations on your excellent article "Professional Status Through Legislation" in the July issue of AE (From Washington, pg. 25). It is one of the first analyzations that I have seen on this subject.

It is, as you state, extremely unfortunate that Mr. Siciliano and his associates cannot recognize or understand the need for objective action in this area. We, in the field service of the government, know from bitter experience of the gross inequities that confront the professional engineer in civil service.

There is a great need to encourage engineers to enter—and remain as career professionals—in the government service. Dedication to a cause is not sufficient stimulus to accomplish this end *ad infinitum*. We can only hope that capable top level administrators—men with courgae and vision—will soon face up to this situation and take the necessary appropriate action that is so obviously required.

L. R. BECHT, P.E.
Coronado, Calif.

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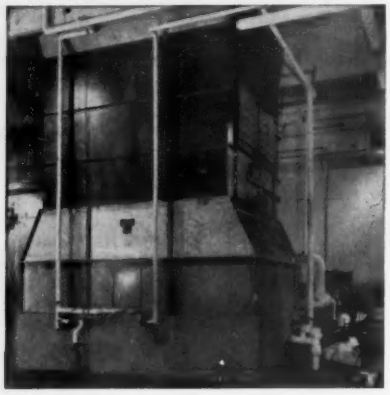

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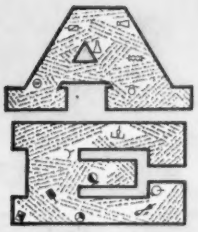


"This Month"

During World War II many in the Armed Services who were engineers or were later to become same, learned about the metric system in action by working with the French, the Swiss, and later with victory, the Germans. This writer witnessed some of this and it can be accurately reported that metric received more huzzas than not. Now the proposal for the U.S. to go metric is back with more supporters than ever. Read the latest about the Great Debate: "Should We Adopt the Metric System?"--beginning on page 23.

A special 16-page insert (the first of several planned) marks another step in the editorial expansion program for AE. Don't miss these most informative papers directed at engineers in private or government practice but of interest to nearly all engineers. Page 29.

Water, they will tell you out in the Midwest, is what you either have too much of or too little. Not so, at least industrially speaking. The fact is that U.S. industry is quickly becoming seriously short of this liquid of life and we present on page 43 a staff report on what industrial engineers and others think about it.

There is little doubt but that the first astronaut will be an engineer. Meet the seven men now being trained for the job and find out how engineering training is once again filling the bill! Page 47.

A new feature: NSPE's Board of Ethical Review is now regularly considering cases of ethical infractions being called to its attention. AE will report findings on these cases as they are made available. The first appears on page 51.

And, on industrial relations, " 'Sounding Board' Organizations and Their Affiliation with NSPE" begins on page 52.

In the News Pages:

General News: A bill has passed both houses of Congress which calls for special recognition in the fields of engineering and science, and it is now on Ike's desk. Page 8.

Consulting. Page 11. The headlines: Three More Senators Back Retirement Bill . . . CPA Firm Not Under Wage-Hour Act . . . TVA Revenue Bill Signed by President . . . NSPE Requests Clarity on Senate Amendments.

Education. An ECPD survey has revealed that a student's family has a great influence on his career choice. On page 14. Other stories tell of easy placement for most engineering grads (page 14) and of a new professional division at Ohio State's College of Engineering (page 15).

Government. The NSPE calls on Postmaster General Summerfield to appoint a P.E. to top post in the department, page 16. In other stories, the army has revised its "Scientific and Engineering Assistant's Program," and on page 17 we learn that, unhappily, the government attracts more of the lower grade engineering seniors.

Industry. As we go to press: the latest developments on the labor bill and NSPE-backed provisions (page 18). In another story, page 19, engineering titles are restricted by a Massachusetts firm.

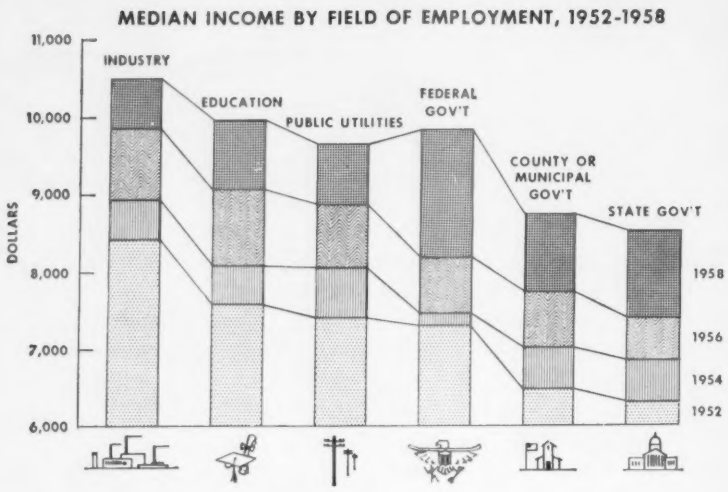
Kenneth E. Trombley

Editor

Just Off the Press!

NSPE's 4th Biennial

PROFESSIONAL ENGINEERS' INCOME and SALARY SURVEY



Here is the latest in a continuing series of income and salary surveys of the engineering profession made by the National Society of Professional Engineers. Started in 1952, the surveys are part of a long-range income and salary study program. The fourth biennial survey gives a detailed picture of engineer earnings by year of entry into the profession, by geographical region, by type of employer, by engineering specialty—and by a variety of other categories. Salary and income data from approximately 19,000 registered, professional engineers were studied for this newest survey report. Published in handy booklet form, the 1958 Survey provides a documented study at all levels of professional experience. One of the features of the report is a detailed analysis of salary trends recorded in the four surveys to date.

GET SOUND STATISTICAL ANSWERS TO THESE QUESTIONS

- Which of the major engineering specialties has the highest median earnings?
- In what fields have professional engineers achieved the largest gains in total earnings over the period 1952-58?
- How do engineering salaries compare in the fields of education, public utilities, industry, government and private practice?
- How much, percentagewise, have engineer earnings increased throughout the country during the period 1952-58?

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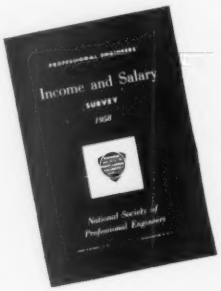

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Vol. 29, No. 9

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Program Approved to Honor Engineers and Scientists

- Federal Plan Passes in Late Action
- Robbins Says Recognition is Important

Approval of a national program to recognize outstanding individual contributions in the fields of engineering and science has been given by the House Committee on Science and Astronautics. The purpose of the program is to encourage total national effort in engineering and scientific pursuits, encourage individuals to embark upon engineering and scientific careers and to focus public attention on national needs in engineering and science.

AS WE GO TO PRESS . . .

The bill approved by the House Science Committee has been passed by both the House and Senate and sent to the President for his signature. It calls for the establishment of a National Medal of Science "to provide recognition for individuals who make outstanding contributions in the physical, biological, mathematical and engineering sciences."

Paul H. Robbins, NSPE executive director, told the Committee that national emphasis on the contributions of engineering to our economy and defense efforts is as important as the role of pure or basic research. "In fact," he said, "much of our progress in developing guidance systems and advancing our missile program is dependent upon the practical application of known scientific principles. While no informed person can minimize the tremendous importance of basic research, we cannot fail to acknowledge the contribution of those whose individual lifework is concerned with collecting that mass of knowledge derived from basic research and actually developing from it objects of practical application."

Mr. Robbins further declared that advanced engineering and the development of top quality engineers are no less significant to our technological progress than an expansion in our scientific research efforts. "The proposal before this Committee provides an excellent mechanism for calling public attention to the vital role which engineers and engineering will continue to perform in our over-all technological progress.

"Although the line of demarcation between engineering and science is difficult to define, it would not be to the best advantage for this Committee to place undue emphasis on pure or basic research to the detriment of the public's appreciation of engineering," he continued.

Mr. Robbins added that "over the years it has been observed that there is perhaps no greater incentive to full development of individual engineers, both professionally and technically, than commensurate public recognition of the role played by the engineer in our national economy. The esteem in which the engineering profession is held by the public is directly related to the engineer's main goal—public service. It is only fitting, therefore, that at this period in our history when technological progress may mean the difference between existence or obliteration, the Congress provide a program which will give meaningful recognition to individuals who make outstanding contributions in engineering and science."

The program of Federal recognition authorized by the Committee would take the form of an appropriate medal to be presented annually by the President to not more than twenty individuals who have outstanding records in engineering or scientific achievements.

ARBA Highway Meeting Scheduled Oct. 26-28

The panel discussion approach to lively programming is being used extensively in arranging the meeting schedule for the Seventh Annual National Highway Conference for County Engineers and Officials, scheduled to be held at the Leamington Hotel, Minneapolis, Minn., October 26-28.

The tentative program, announced by Ben F. Ostergren, managing director of the County and Local Roads Division of the American Road Builders' Association, includes five such panels on various problems confronting county road officials. In addition, the program includes addresses by Public Road Commissioner Ellis L. Armstrong, Maj. Gen. Louis W. Prentiss, U.S.A. (Ret.), executive vice president of ARBA, and other highway leaders.

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2 Special Inserts in This Issue . . .

On page 29

Consulting . . .

Here are three papers of particular interest to consulting engineers but also of benefit to others. These pieces, presented at the 25th Anniversary meeting of NSPE at New York this summer, are down-to-earth presentations you will not want to miss. The titles and authors are: "Duties and Responsibilities of a Principal in a Consulting Engineering Firm," by J. L. Breeze, P. E., J. L. Breeze Associates, Santa Fe, N. Mex.; "Let's Be Realistic on Fee Schedules," by Frank E. Sanford, P. E., Vice President, Business Development Commonwealth Associates, Inc., Jackson, Mich.; and "The Functional Section in Proper Perspective," by Harvey F. Pierce, P. E., Consulting Engineer, Miami, Fla.

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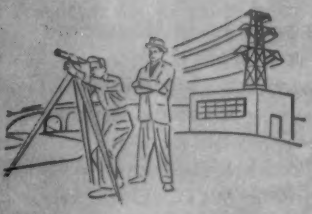
Government . . .



For professional engineers in government the AE presents three presentations from the New York meeting: "Legal Problems in Serving the Needs of Government Engineers Through the Professional Society," by Frank J. Durkin, P. E., member New York Bar, New York, N. Y.; "Ethical and Professional Problems Created by the Mayor's (N.Y.C.) Executive Order No. 49," by John T. Dollard, P. E., Senior Assessor, Public Utility Bureau, N.Y.C. Tax Dept.; and "Classifying Engineering Positions in the Federal Government," by Seymour S. Berlin, Ass't. Director, Bureau of Inspections and Classification Audits, U. S. Civil Service Commission, Washington, D. C.

COMING SOON: SPECIAL INSERTS FOR ENGINEERS IN INDUSTRY AND EDUCATION

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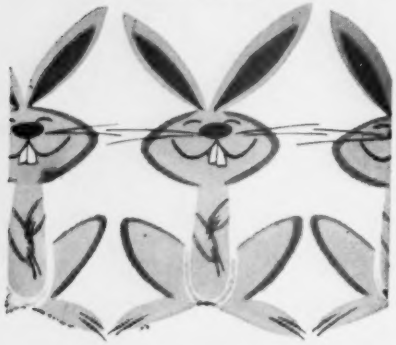
The difference in



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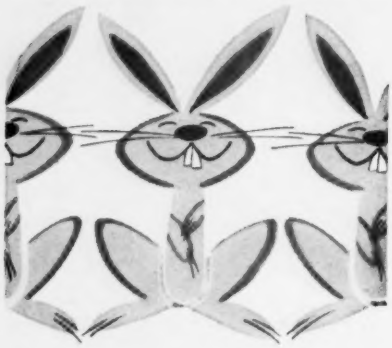

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3,000 Expected at ASCE Annual Meeting in Oct.

Engineering projects and problems in foreign lands flavor an exceptionally heavy program for the annual convention of the American Society of Civil Engineers, to be held at the Hotel Statler-Hilton, Washington, D. C., October 19-23. More than 3,000 are expected to attend.

Offering evidence of the increased activity of American engineers abroad, about one-fifth of the 163 papers scheduled for the technical program are devoted to engineering projects in many parts of the world, or to problems related to foreign engineering operations.

R. T. Sessums Promoted To Brigadier General

Roy T. Sessums of New Orleans, assistant vice president of Freeport Sulphur Company and Louisiana member of the NSPE Board of Directors, has been promoted to the rank of brigadier general in the U. S. Air Force Reserve.

General Sessums received his Bachelor of Science degree in civil engineering from Louisiana Polytechnic Institute, Ruston, La., in 1935. He received his Master of Science degree in engineering from Louisiana State University in 1936 before doing a year of advanced graduate study at the University of Minnesota.

From 1937 to 1940 he was instructor and later assistant professor of engineering at Louisiana Tech and in 1940 was named dean of the School of Engineering.

In 1942 he was granted a leave of absence and was commissioned a first lieutenant in the Army Air Forces. He was assigned to the Training Aids Division and later to the office of the assistant chief of staff for training at the Pentagon. He served in Europe with the U. S. Strategic Bombing Survey, which unit he later commanded. He is presently assigned to the Air Research Development Command, Air Force Missile Test Center, at Cape Canaveral, Fla.

He continued as dean of engineering at Louisiana Tech until 1952, resigning to become director of the Louisiana State Department of Public Works. He resigned that post in 1955 to join Freeport Sulphur Company as assistant to vice president and coordinator of engineering. He was elected assistant vice president in 1958.

Edward E. Alt Elected New WSWMA President

Edward E. Alt has recently been elected president of the Water and Sewage Works Manufacturers' Association.

An active figure in the water works industry, he has represented Chicago Bridge & Iron Company on the WSWMA board of governors for the past five years.

Chemical Engineers to Hear Von Braun, Mayo

Wernher Von Braun, the noted rocket and missile expert, and Dr. G. W. Mayo, of the Mayo Clinic, Rochester, Minn., will be speakers at the forty-first national meeting of the American Institute of Chemical Engineers, September 27-30, at St. Paul, Minn.

Mr. Von Braun will be the principal speaker at the banquet, Tuesday, September 29, and Dr. Mayo will address the luncheon that same day. Dr. Mayo's address will be titled "Health, and Instrument for Peace."

Arrangements are being made for an attendance of more than 1,000 chemical engineers from all parts of the country.

Canadian P.E. Council Elects Turnbill Head

D. O. Turnbill, of Saint John, New Brunswick, has been elected president of the Canadian Council of Professional Engineers.

Other officers elected were: J. G. Dale, of Edmonton, Alberta, vice president, and W. L. Wardrop, of Winnipeg, Manitoba, member of the Executive. Leopold M. Nadeau, of Ottawa, Ontario, was re-elected executive secretary.

USE THE READERS' SERVICE DEPARTMENT—PAGE 65

Three More Senators Back Retirement Bill

- Committee Urged to Report H.R. 10
- Hearings Concluded in August

In separate statements, Senators Leverett Saltonstall of Massachusetts, Gordon Allott of Colorado and Frank E. Moss of Utah have urged the Senate Finance Committee to report H.R. 10 before the end of the present Congressional session. The bill, officially known as the Smathers-Morton-Keogh-Simpson bill, would permit self-employed individuals, including consulting engineers, to annually deduct on a tax-deferred basis up to $2,500 of their income, provided such sums are placed in certain types of restricted retirement plans.

Senators Saltonstall, Moss, and Allott . . . speak out on behalf of H.R. 10.

Senator Saltonstall, a member of the Senate since 1944, characterized the self-employed as "the backbone of the country" from whom came many of the ideas and efforts that help build our country. Observing that Senate action has been delayed because of Treasury Department opposition to the proposal, the Senator admitted that some reasonable answer must be found to solve the problem of revenue loss. "But," he added, "since this matter has already dragged on for so many years, the best thing would be to get the principle of a self-employed retirement fund program established as soon as possible."

In a statement on the Senate floor, Senator Gordon Allott declared that it is squarely before the Congress to act to remove the inequity in existing tax law which does not accord self-employed persons tax treatment for their retirement savings comparable to that now accorded to employees covered by employer-financed pension plans. "We are the hope," he said, "of the self-employed farmer, small businessman, doctor, professional engineer, plumbing contractor, lawyer, accountant, and many, many others."

Senator Allott also told the Senate members that he studied each objection raised to H.R. 10, and has come to the conclusion that it does not set a precedent for other forms of tax deferral and "certainly is not class legislation, for many of the self-employed are the rugged individuals who often wonder if they are not working more for themselves for pride than for profit."

The Senator challenged the Treasury estimate of a $365 million tax revenue loss the first year if H.R. 10 were enacted. For this to happen the self-employed would have to make payments to restricted retirement plans totalling $1 billion. "There is no reason," he said, "to assume that a million self-employed will immediately deposit $1,000 each under this plan. Indeed, surveys indicate that only about 50 per cent of the self-employed intend to utilize this plan at all."

At the final day of hearings on the bill, Senator Frank E. Moss told the Finance Committee that he favored the bill, and that since the proposal has been before Congress for eight years always with bi-partisan support, it should be enacted during the present session.

"Self-employed people are not asking local, state or Federal Governments to take care of them in their retired years," he said. "They are asking simply for a postponement of tax liability so that they may be able to set something aside for their old age. They are willing to put up the money when they are able to spare it from the demands of their business. All they are asking of us, the Congress of the United States, is that we offer them the same tax consideration that eighteen million corporate employees are receiving, so that they can provide for themselves."

Finance Committee hearings, which began in mid-June and resumed for one day on July 15, were concluded on August 11. An NSPE spokesman testified in support of the bill at the June hearings.

On the basis of extensive questioning by Senator Wallace F. Bennett of Utah at the July session, it appears that an attempt may be made to amend the bill to provide that no self-employed individual could set up a retirement plan for himself unless he provided a retirement plan for his employees at the same time. Under existing tax laws, the self-employed may provide a retirement program for their employees, but not a similar program for themselves.

According to corporation tax law, pension plans of corporations must not be discriminatory, that is, they must provide benefits for employees as well as officers and executives. The apparent thinking of Senator Bennett and the Committee members would be to apply this same concept to H.R. 10 under a plan which would require the self-employed to provide retirement plans for their employees in order to set one up for themselves.

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CPA Firm Not Under Wage-Hour Act

- District Court Issues Ruling
- Professional Opinions Involved

A further analysis of the applicability of the Federal Wage-Hour Act to firms which render a professional service was enunciated recently by a Federal district court in Minnesota in a ruling which held that a firm of certified public accountants was not subject to the Act. The court's opinion was based mainly on the ground that the nature of the firm's activities as professional advisers are divorced from and apart from the objectives of their clients so that they cannot be properly held to be "directly and vitally related to the functioning of an instrumentality or facility of interstate commerce so as to be, in practical effect, a part of it."

The court distinguished the operations of the certified public accountants from those of consulting engineers, which were held by the U. S. Supreme Court in the *Lublin, McGaughy* case (AMERICAN ENGINEER, FEB., 1959) to be so closely related to the functioning of instrumentalities of interstate commerce as to warrant being held subject to the Act. The Court there held that "without the preparation of plans for guidance, the construction could not be effected and the facilities could not function as planned."

In the instant situation, suit was filed by a stenographer-clerk employed by the firm of accountants for payment of overtime wages alleged to be due her. The court ruled that the employee was not engaged in the production of goods for commerce because the firm of certified public accountants produces no "goods" with which she could be involved. "The defendants have no product, they offer only services, their professional opinion. Whether that opinion is communicated by means of a report, or on a tax return, or even orally, it is an expression of a professional opinion."

The reduction of the firm's professional opinions to paper does not turn their services into a saleable commodity, the court also noted. Even though such opinions are transmitted across state lines to firms engaged in interstate commerce, "they are nothing more than opinions and they cannot by any stretch of the imagination be transmitted into products, goods, wares, or saleable commodities."

The court placed great stress upon the fact that the firm's function is to review the accounting records and systems of their clients and to render professional opinions based upon such review. "Their functions as professional advisors are divorced from and apart from the motives and objectives of their clients engaged in interstate commerce," the court added.

Acknowledging that there might arise situations in which the firm's services, though not directly related to their clients' interstate business, would be vital to the continued operation of such commerce, the court declared that merely being "vital" is not enough. The

requirement of the Act for coverage is that the activities must be "directly and vitally related to the functioning of an instrumentality or facility of interstate commerce * * * * and even if the defendants' services were vital, they are certainly not *directly* related to interstate commerce."

With reference to the *Lublin, McGaughy* decision, the court noted that the U. S. Supreme Court characterized the activities of the consulting engineering firm as being directly and vitally related to interstate commerce, in that the work of fieldmen, draftsmen, and surveyors was involved "in furtherance of the objective—the construction of a facility vitally and directly related to interstate commerce." However, "in the instant case it would be unrealistic to find the defendants' activities constituted a vital and direct part of their clients' activities."

The issue of the relation of the firm's activities to those of their clients is further emphasized by the character of the accountants' professional obligations, the court said. As members of several professional societies, the firm of certified public accountants is bound to observe the rules of ethical practice as promulgated by those societies. Among those enumerated by the court were: 1) the defendants may not share or participate with laity in any manner in the fees of professional work; 2) they may not engage in any business or occupation incompatible or inconsistent with the practice of the profession of certified public accountancy; 3) they may not solicit for clients; 4) they may not practice their profession in corporate form; and 5) they may not submit a competitive bid for a professional engagement. In order to uphold these standards of practice in their profession, the court noted, the defendants must be independent from the activities of their clients, since the rules of professional conduct of the firm's profession define the basic relation between the certified public accountant and his client as one of complete independence.

TVA Revenue Bond Bill Signed by President

President Eisenhower has signed into law the bill to permit the Tennessee Valley Authority to issue its own revenue bonds to finance expanded operations and facilities.

Without taking a position on the relative merits of this controversial proposal, NSPE had consistently urged the elimination or amendment of a clause which would have authorized TVA to perform engineering design services for non-Federal and non-TVA parties in connection with lease-purchase arrangements. In response to the Society's position, the Senate Public Works Committee amended this language by inserting the word "necessary," thus limiting TVA's engineering authority under this bill "to such necessary work of this nature."

The Senate amendment was accepted by the House and appeared in the bill's final form as it was sent to the President's desk. (Public Law 86-137).

The apparent significance of this decision lies in the fact that a Federal court has ruled that the rendition of a consulting accounting service does not directly involve the professional firm in the activities of the client to the extent necessary for coverage under the Wage-Hour Act, but that the same does not hold true for the consulting engineer.

According to the latest available information, this decision will not be appealed. (*Harder* v. *Anderson*, U. S. District Court, Dist. of Minn., Third Div., Civil No. 3-58-131, May 27, 1959).

NSPE Requests Clarity on Senate Amendments

NSPE testimony before a Senate Armed Services Subcommittee has requested a clarification in bills which would amend the Armed Services Procurement Act by requiring that where negotiation of contracts is presently authorized, "such negotiation incorporate procedures of 'competitive negotiation' to the greatest extent practicable."

Under existing law, the procurement of professional services are exempt from competitive bidding or formal advertising requirements. The proposed language apparently would permit the application of "competitive negotiation," with price a factor in the awarding of a contract, in all instances where negotiation is presently allowed.

The NSPE spokesman told the Subcommittee that "although it can correctly be asserted that these bills do not *require* the procurement of professional services by competitive bidding, we nevertheless believe that as presently worded they tend to make such practices *permissive*. And even permissive authority, which could lead to competitive price factors in the awarding of a contract for professional services, is completely at variance with generally recognized practices, professional policies, and engineering ethics."

The Society was assured by Senator Leverett Saltonstall, sponsor of one of the bills under consideration, that "I had not the slightest intention and . . . did not conceive that this bill would cover the question of competing for personal services."

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ECPD Survey Reveals Family Influence As Major Factor

Family influence is the biggest factor in sending students into engineering, a survey of 10,000 students in twenty-three engineering colleges has revealed.

The survey, conducted by the Engineers Council for Professional Development, found that 25.7 per cent of the students listed their families as the most important influence in reaching a decision to enter the engineering field. Only 12.1 per cent said their teachers were the biggest factor. High school counselors were even less of an influence, being checked on only 5.5 per cent of the questionnaires.

Another ten per cent said friends had been a major factor in the decision. Only two per cent listed the availability of a scholarship as having an important bearing on the selection of a career.

Reasons lumped together under an "other" column accounted for 44.7 per cent of the replies. Included were such reasons as "personal interest," "own decision," "job and military experience," "contacts with engineers," "reading," "financial return," "aptitude and hobbies," "preference for mathematics and science," and "ability."

In summarizing the survey, ECPD said many of the reasons listed under the "other" column indicated that young people choosing engineering as a career have "independence of thought and analyze things for themselves." "As related to guidance work it means we must reach the young people directly," the summary said.

The survey also indicated a need, the ECPD concluded, for the story of engineering opportunities to be presented to parents. ECPD said this can be accomplished through talks to PTA groups and service clubs in addition to publicity and Engineers' Week activities.

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Amendment to NDEA Act Fails in Senate

A Senate committee amendment to the Health, Education and Welfare Department's 1960 appropriations bill that would have made the National Defense Education Act Vocational educational funds available to train apprentices and skilled workers, has been stricken from the bill on the Senate floor upon a point of order raised by Senator Prescott Bush.

Vocational education funds made available under the NDEA are presently limited for use "exclusively for the training of individuals designed to fit them for useful employment as highly skilled technicians in recognized occupations requiring scientific knowledge * * * in fields necessary for the national defense." This language appears in the Act as the result of an amendment offered by Senator Bush on the Senate floor when the bill was under discussion last year. The Senator's point or order was sustained on the ground that it is improper and not in order to amend existing statutes by language inserted in appropriations bills

According to Senator Bush, amendments to the Defense Education Act in line with the language stricken from the appropriations bill are favored by certain AFL-CIO unions, contractors' associations and the American Vocational Association.

'Good Healthy' Year In Grad Placement

Engineering schools are enjoying a "good healthy" year in the placement of graduates, the Northwestern Life Insurance Company's twenty-fourth annual University and College Placement Survey reports.

Three-fourths of the engineering schools reported more job offers this spring than last with the gains generally running from ten to twenty per cent, the survey said.

Starting salaries for engineers will average between $490 and $510 this year compared with $385 to $420 for the average business school graduate. Liberal arts majors will probably get their first jobs at a few dollars less than the business graduates, the report predicted.

The report was based on a sur-

vey of seventy-eight technical schools and university engineering colleges, sixty-eight university schools of business administration and sixty-five liberal arts colleges and university liberal arts departments.

A fourth of the engineering schools estimated 100 per cent placement of available men by graduation with another forty-four expecting total placement of their graduates by October 1.

Professional Division Planned at Ohio State

An academic reorganization of the Ohio State University College of Engineering has been approved by the university's board of trustees. Major changes include establishment of a Pre-Engineering Division for the first two years of preprofessional study and a Professional Division for the last three years of the five-year program. Graduation requirements are based on the successful completion of the work of the Professional Division.

Under the new plan, students will be admitted to the Professional Division of the college upon completion of a two-year pre-engineering program. The pre-engineering studies may be taken in the Pre-Engineering Division of Ohio State's College of Engineering, or at accredited liberal arts colleges, including the Ohio State College of Arts and Sciences, branch campuses, and any other colleges and universities offering a comparable curriculum in pre-engineering.

The pre-engineering curriculum will be common for all branches of engineering, with the exception that students who expect to enroll in any of the chemically based curricula in the Professional Division will schedule two courses in quantitative analysis which would not be required of students who enter any of the other professional curricula. The program in pre-engineering will include work in English, mathematics, physics, chemistry, engineering drawing, and engineering mechanics. Also included is the equivalent of nearly one quarter's work in the humanities and social sciences and the university requirements in physical education and military science. Admission to the Professional Division will be contingent upon completion of this work, or its equivalent, with an average grade of "C" or better.

Dean Harold A. Bolz of Ohio State's College of Engineering said: "The new curriculum will provide a two-year preparatory period wherein students may reflect more fully upon their choice of a career. Furthermore, students who enter the Pre-Engineering Division and later indicate questionable interest or ability in engineering can terminate their studies, or transfer to another educational program, with some pride of accomplishment rather than continuing to failure in the upper years.

"The engineering faculty who developed the curriculum over the past two years feel that it will have a significant influence in attracting to engineering in their third year many capable students who did not seriously consider engineering at the time they entered college, or students who preferred to do their first two years of college work in a liberal arts school or in a community college near their homes."

Stimulates Interest

Chemistry students Frederic G. Kurtz, left, and Gary Tresize, may have thoughts of a career in the sciences as they view these Kodak pictures at an exhibit at West High School, Rochester, N.Y. Developed as an aid to teachers for classroom use, the photographs show varied scientists, with their equipment, at work on projects at Kodak Research Laboratories.

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NSPE Urges Summerfield to Appoint P. E. for Top Post

The National Society has urged Postmaster General Arthur E. Summerfield to appoint a professional engineer as chief of the Manpower Utilization Division in the Office of Research and Engineering of the Post Office Department.

In a letter to Postmaster Summerfield, NSPE executive director Paul H. Robbins pointed out that the "qualifications for this position include graduation from an accredited engineering school and very substantial experience in the field of work measurement systems, work performance standards, and related engineering activities."

Mr. Robbins also stated in his letter that "when the qualifications for a position include an engineering background and education and when the grade and salary for the position have been determined principally on the basis of these, the National Society of Professional Engineers is deeply interested in seeing that the qualification requirements are not relaxed when the appointment is made."

NSF Establishing New Personnel Plan

At the request of the Bureau of the Budget, the National Science Foundation has announced that it is accepting leadership on behalf of interested Federal agencies for establishing and maintaining a program of national information on engineering and scientific personnel.

Goal of the new program is the obtaining of timely information on the supply, demand and utilization of engineers, scientists and technical personnel. Much of the information to be obtained will be produced by extending existing statistical series to identify engineers and scientists or to add items of information. In addition, other projects will be initiated to meet the objectives of the program.

A special advisory panel formed to develop a coordinated plan for statistics on engineers and scientists has recommended three projects in particular to be started as "most urgent" these projects are:

- Identification of engineering, scientific and technical occupations.
- A periodic survey of all types of employers to obtain information on the numbers and characteristics of engineering and scientific personnel.
- A periodic study of the demand outlook for various categories of engineering, scientific and technical personnel in each major activity.

Meetings of Note

Illuminating Engineering Society—National Technical Conference, September 7-11, Hotels Fairmont and Mark Hopkins, San Francisco, California.

American Chemical Society—National Meeting, September 13-18, Atlantic City, New Jersey.

Institute of Traffic Engineers—Annual Meeting, September 14-17, Hotel Commodore, New York, New York.

American Society of Mechanical Engineers and **American Institute of Electrical Engineers**—Engineering Management Conference, September 17-18, Statler Hotel, Los Angeles, California.

Standards Engineers Society—Annual Meeting, September 21-23, Somerset Hotel, Boston, Massachusetts.

American Institute of Chemical Engineers—National Meeting, September 27-30, St. Paul Hotel, St. Paul, Minnesota.

Army Announces Revised Program

New regulations issued by the Department of the Army have changed the name of the former SPP program to the "Scientific and Engineering Assistant's Program" and have amended applicable procedures in several significant respects. The new program will be limited to enlisted personnel in engineering, mathematical, physical science and biological science fields. Management type individuals are eliminated.

The new regulations also provide for the elimination of those jobs which do not require skill and knowledge at the professional level, and for a general tightening up of positions included in the S & E Assistant's Program.

Assignment to the S & E Program will not in itself exempt personnel from such duty roster details as kitchen police, interior guard or barracks orderly. Commanders are encouraged, however, to take every reasonable means to minimize interruptions of the specialized duties of these personnel in connection with research and engineering projects.

A new feature of the revised program will encourage the establishment of an S & E Advisory Group at every installation utilizing fifty or more enlisted personnel classified in the S & E Assistant's Program. Members of the Group could include military personnel at the installation, civilians experienced in the type of research conducted at the installation, representatives of the installation's civilian personnel office as well as several enlisted members of the S & E Assistant's Program.

The primary function of the Group would be to render advice, assistance and recommendations to the installation commander with regard to assignment and utilization practices in the functioning of the program.

Senate Acts on NSPE Proposed Amendment

An amendment suggested by NSPE to prevent a potential inequity for engineer officers with regard to credit for eligibility for retirement purposes in the Public Health Service Commissioned Corps Personnel Act of 1959 has been accepted by the Senate Committee on Labor and Public Welfare and passed by the Senate.

The bill, S. 2220, is designed to strengthen the Commissioned Corps of the Public Health Service by re-establishing parity for retirement purposes between officers of the Commissioned Corps and those commissioned in the Armed Forces.

As originally introduced the bill provided for the retirement of certain officers after twenty-five years of "active commissioned service." This would have resulted in an inequity to three officers in the Service, all of whom are engineer officers, who rendered some years of active professional service as civil service employees rather than as commissioned officers.

The Committee acted upon the recommendation of NSPE to delete the word "commissioned" with the result that engineer officers coming under the applicable provision would be entitled, for retirement purposes, to count up to five years of civil service employment if the Surgeon General determines that service to have been comparable to service performed by commissioned officers.

Government Losing In Quality Race

Government is attracting more of the lower grade engineering seniors than industry and universities. A survey of 1016 seniors shows that while government agencies may be attracting enough graduates numerically, only twenty-nine per cent had maintained A or B averages, compared to forty-six per cent for industry and sixty-five per cent for universities.

By subgroups, 388 electrical engineering majors showed forty-two per cent with government-employment aims were A or B grade people, while seventy-four per cent of the academic people and fifty-one per cent of the industry group earned A or B averages. Among 286 mechanical engineering majors the results were essentially the same.

The report on the survey is by Joseph L. Seminara, human factors specialist, Dover, N. J. Mr. Seminara says the survey has serious implications. "If the situation continues, efficiency of governmental agencies may suffer. Responsible administrators must determine what known disadvantages of government service can be corrected. Study is required to determine the basis for the negative attitude toward government employment exhibited by higher grade graduating engineers," he said.

Navy Bureau Embarks On Recruiting Campaign

The Navy's Bureau of Yards and Docks has embarked on a five-year engineering recruitment campaign in the nation's colleges.

A major step toward the campaign goal is the enrollment of twenty-seven engineering and architectural graduates who are participating in the Bureau's 1959 Professional Development Program. Also on board in the Bureau, located in Arlington, Va. just across the Potomac River from the Nation's Capital, are thirteen summer student trainees and professional employees receiving special training in the various engineering programs of the Bureau.

The development program also extends into the Bureau's many field activities. The recruitment of graduated engineers has been successful and indications are that the Bureau will acquire the largest number of promising college engineering graduates in a single year in the history of the Bureau. Thus far this year the Bureau has employed sixty engineers and architects under its over-all program.

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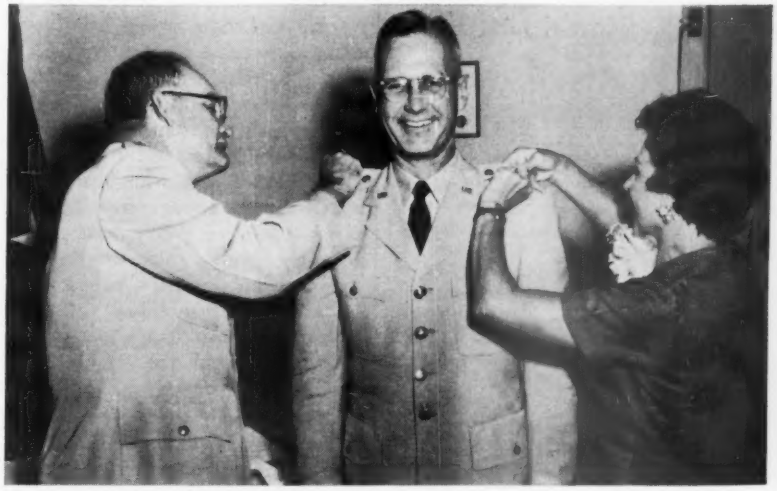

The new stars of a brigadier general are pinned on the shoulders of Harold K. Kelley, deputy director for construction in the Air Force's Directorate of Civil Engineering, by his wife, Mary, and Major General A. M. Minton, the Air Force director of civil engineering, at ceremonies at the Pentagon recently.

House Approves Labor Bill With NSPE-Backed Safeguard

- Legislation Passes in 229-201 Vote
- Most Acceptable Approach for P.E.'s

By a record vote of 229-201, the House has agreed to substitute a labor reform bill introduced by Representatives Landrum and Griffin (H.R. 8400) for the bill reported out by the House Labor Committee. From the standpoint of professional engineers, the "construction industry" provision in the Landrum-Griffin bill is the most acceptable approach introduced thus far for dealing with the particular problems in the construction industry.

The Landrum-Griffin bill provides for National Labor Relations Board certification of unions in the construction industry without a previous election being held, but in addition contains several safeguards to protect the rights of individual employees. Most significant for professional engineers is the provision limiting certification "to such unit as the Board may find is normally represented by the labor organization in the building and construction industry for the purposes of collective bargaining. . . ."

Late Development . . .

House-Senate conferees, meeting to resolve differences between two versions of the labor reform bill, have voted to eliminate the entire construction industry provision. With this language deleted, union representation in the construction industry will follow the usual election procedures under which professional employees are entitled to a separate vote. NSPE had consistently urged that should a construction industry provision be added to the labor reform bill, it contain language protecting the existing rights of professional employees.

Based upon NSPE's detailed analysis of this section, it appears that the quoted language will protect professional engineers from being included in the certified unit against their expressed desires, inasmuch as they are not normally represented by building trade unions.

The Committee-approved bill, which lost out to the Landrum-Griffin substitute, contained a provision which would have permitted unions and employers in the construction industry to sign agreements providing for union representation without going through the usual employee election procedure in order to select an exclusive representative. This provision, similar to that in the Senate-approved Kennedy-Ervin bill, has been characterized by NSPE as failing to adequately safeguard the self-determination election rights of professional employees presently guaranteed in Section 9(b) (1) of the Taft-Hartley Act.

Although the report on the House Committee bill declared that it was not the Committee's intention for this provision "to affect the status which professional engineers now enjoy under the National Labor Relations (Taft-Hartley) Act," NSPE nevertheless had continued to urge the adoption of specific wording in the bill itself in order to give force and effect to these declarations of intent, and to eliminate the possibility of doubt or confusion at a later date.

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Engineering Titles Restricted By Firm

The Bay State Abrasive Products Company, Westboro, Mass., is the latest industrial firm to announce new policies restricting the title "Engineer" to legally qualified personnel. Dr. H. Nathan Stone, director of research and development, announced the company's Executive Committee policy decision would limit the engineering designation to only those of its employees who are registered professional engineers. The company is reported to be the third largest abrasives manufacturing concern in the world and is the first major industrial-engineering corporation in Massachusetts to apply the registration requirement to engineering positions since the Massachusetts law was strengthened recently. The company announcement stated:

"The term 'Engineer' should be omitted from all titles of Bay State employees unless such person is registered as a professional engineer in the Commonwealth of Massachusetts. The use of this title may be continued provided such person is now so registered or has made application for registration. If such applicant is turned down, the term 'Engineer' must be dropped from his title and one of the following terms used;

In the Research & Development Department and in the Quality Control Department, the term 'Chemist' or 'Ceramist' shall replace the term 'Engineer;'

In the Industrial Engineering Dept., the term 'Analyst' shall replace the term 'Engineer.' In Plant Engineering Departments the term 'Machine Designer' shall be used;

The use of the title 'Sales Engineering Dept.' shall be continued provided the Manager of this department is or becomes a registered professional engineer; and

The term 'Engineer' shall be changed to 'Abrasive Specialist' for outside personnel of the Sales Engineering Dept. and any non-registered inside men shall be known as 'Technical Service Men' unless they become registered."

The company stated that the ruling will apply to all Bay State field personnel whether they operate out of Massachusetts or not.

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Concrete and Cement Curing Material	967-million
Control Instruments	154-million
Conveyors	107-million
Electric Motors	537-million
Electronics	222-million
Engines	170-million
Heat Exchangers	370-million
Indicating and Recording Instruments	125-million

Product	Amount Purchased Annually
Iron/Steel Pipe	526-million
Lighting Appliances	437-million
Materials Handling Equipment	116-million
Paints	55-million
Piling	400-million
Pressure Vessels	264-million
Prestressed Concrete	711-million
Steel, Alloy	531-million
Steel, Structural	3-billion
Steel, Tubing	191-million
Testing Equipment	78-million
Thermal Insulation	122-million
Transformers	407-million
Valves and Fittings	394-million
Ventilators and Heaters	371-million

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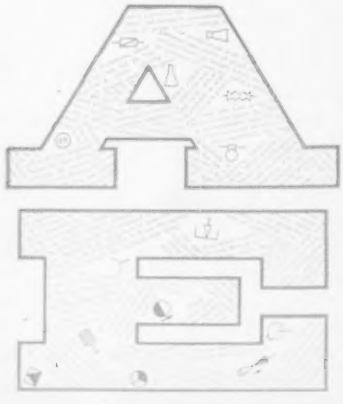

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Strictly Business

Personalities . . . **C. Arnold Dutton** has retired as vice president and director of the **Buffalo Electric Company,** Buffalo, N.Y. . . . **Vulcan Materials Company,** Birmingham, Ala., has announced the appointment of **Harold H. White** as director of blasting practices and explosives research . . . **Felix Viola** has been promoted to director of examinations, Personnel Department, for the **New York City Civil Service Commission** . . . The **Vonbee Company,** Livingston, N.J., has announced the appointment of **Herbert A. Niedhammer** to its staff . . . The appointment of **Kenneth M. Allen** as chief engineer for **Pacific Bridge Company,** Alameda, Calif., has been announced . . . **M. L. Clough** has joined the management consulting staff of **Ebasco Services Incorporated,** according to **H. H. Scaff,** vice president of the management consulting, engineering and construction firm . . . **A. R. Hughes** has been named to the newly-created position of special projects engineer by **Fischer & Porter Company,** Hatboro, Pa. . . . New additions to the staff of the **Benham Engineering Company,** consulting engineers of Oklahoma City and Muskogee, Okla., are **Michel K. Antarakis** and **Billy E. Tindell.**

Mr. Dutton

Edward F. Hensley has joined the operations department of **Dow Chemical International Limited S.A.** as project manager of major foreign engineering and construction projects . . . **R. W. Goeldner** has been named chief engineer of **Cleaver-Brooks Special Products,** Waukesha, Wis. . . . **Herbert H. Fink** has been appointed vice president-development of **B. F. Goodrich Industrial Products Company,** a division of **The B. F. Goodrich Company,** Akron, Ohio . . . **Bradford E. Bailey** has joined **American Cyanamid Company's** project engineering department, New York, N.Y., as a principal project engineer . . . **William M. Scranton,** executive vice president of **Miniature Precision Bearings, Inc.,** Keene, N.H., has been elected a member of the firm's board of directors, it has been announced by **Horace D. Gilbert,** president . . . **H. E. Fisher** has been promoted to the position of project engineer by **Deevy and Shannon,** consulting engineers, Beaumont, Tex. . . . **John J. Cullen** has been named product manager of engineering and molded rubber products by **United States Rubber Company,** New York, N.Y. . . . **Aurnhammer, Jeske and Aurnhammer,** consulting engineers, announce the opening of their new offices at 47 River Road, Summit, N.J.

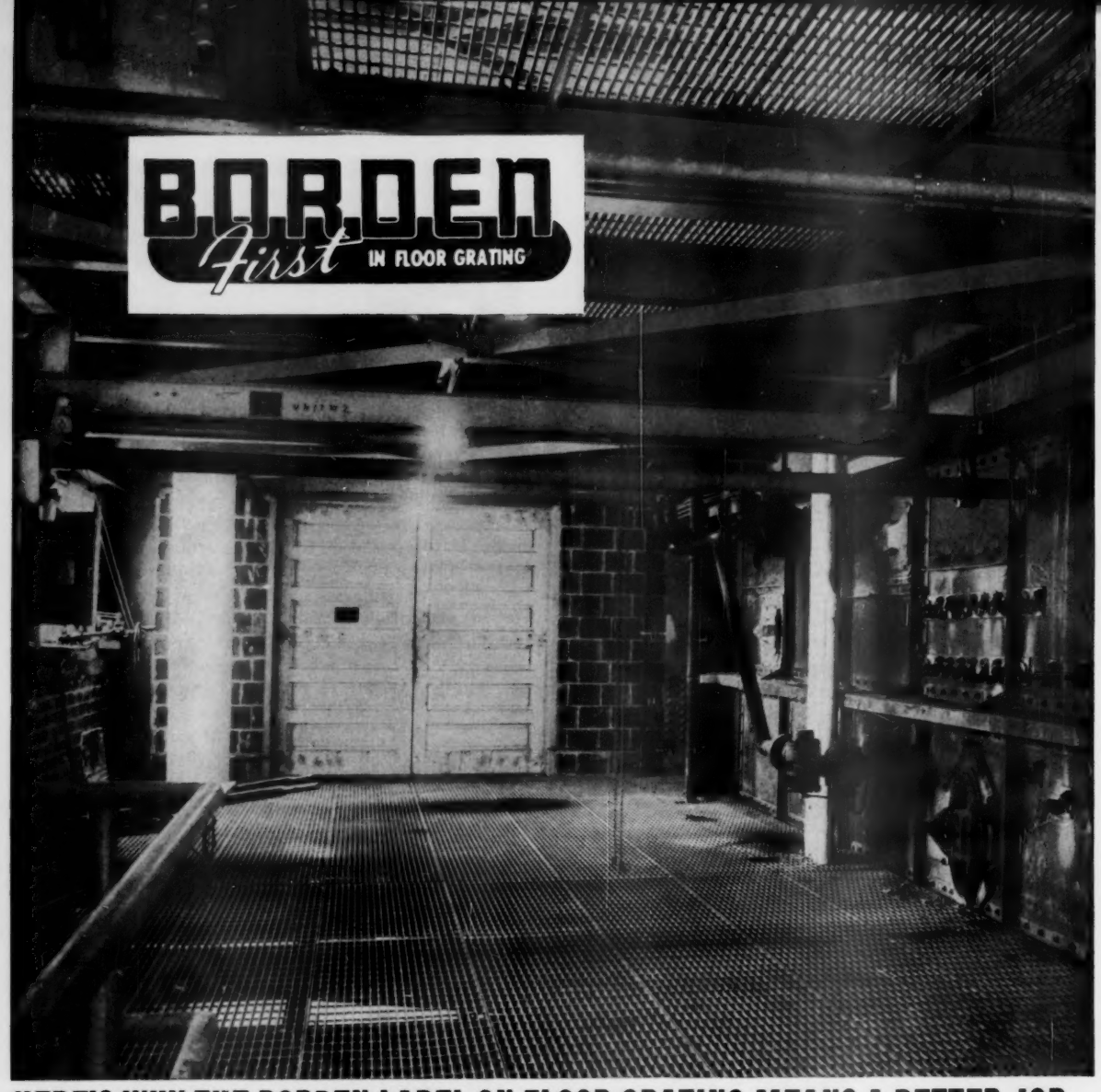
Mr. Fink

The appointment of **Ted R. Thoren** as vice president of engineering has been announced by **Donald R. Spotz,** president of **Pesco Products Division, Borg-Warner Corporation,** Bedford, Ohio . . . **Frederick P. Huston** has been appointed assistant chief engineer for **Tube Reducing Corporation,** Wallington, N.J. . . . **William L. Rodich** has been appointed president of **Continental-Diamond Fibre Corporation,** Philadelphia, Pa. The firm is a subsidiary of **The Budd Company** . . . **Dr. Roy E. Olson** has been named chief engineer of the **Monogram Precision Industries, Lewis and Kaufman Division,** Los Gatos, Calif. . . . **Arthur W. Fasold** has been appointed assistant general sales manager of **Hewitt-Robins, Inc.,** Stamford, Conn. . . . **Donald A. Kaessen** has joined the **Sterling Machinery Company,** Los Angeles, Calif., as chief design engineer in their pump division . . . **Arthur H. Barber** has been named senior vice president of **Walter Hook Associates, Inc.,** Charlotte, N.C. . . . **William Morris** has been appointed to the engineering staff of the **Balteau Electric Corporation,** Stamford, Conn. . . . The retirement of **Pierce G. Fredericks,** commercial vice president of **Federal Pacific Electric Company,** Newark, N.J., has been announced.

Mr. Rodich

American Electronics Company Minneapolis, Minn., has added two new men to its engineering staff. **William Merton Nellis** has been appointed senior design and development engineer, and **Wyman M. Anderson** quality manager and military contracts administrator . . . **Register & Cummins** Jacksonville, Fla. have announced that **Joseph R. Gordon** has been made an associate in the firm . . . **Russell E. Horn** has been named president of **Buchart Engineering Corporation,** consulting engineers, York, Pa. . . . **Henning S. Hermanson** has been named chief engineer of **Elgin Metalformers Corporation,** Elgin, Ill. . . . **Louis Duman,** president of **Advance Transformer Company,** Chicago, Ill., has announced completion of negotiations by which the company will join **Consolidated Electronics Industries Corporation** . . . **Richard W. Hanford** has joined the engineering staff of Advanced Military Systems, Electronic Products, **Radio Corporation of America** . . . **James Hamilton** has been appointed manager of manufacturing engineering of the General Purpose Control Department of the **General Electric Company,** Bloomington, Ill.

Mr. Horn



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The Great Debate:

SHOULD WE ADOPT THE METRIC SYSTEM?

FOR THE first time in twenty years the Federal Government is taking a serious look at the country's system of measurements. The result, many believe, will be the abandonment of the current English system of inches and ounces in favor of the more widely used metric standards.

The American engineering profession is closely watching these new moves in this age-old controversy. And rightly they should, for probably no other profession is more intimately associated with the science of precise measurements.

Today, the English system, to which much of the engineering profession is deeply committed, is coming under increasing attacks from a variety of quarters. In Congress, Representative Overton Brooks has introduced a resolution calling for a full-scale Federal study of the entire question of the English vs. the metric system. At the same time the Bureau of Standards is naming a committee of experts who will investigate the metric system.

While still acting as Secretary of Commerce, Lewis L. Strauss threw his weight behind the proponents of the metric system.

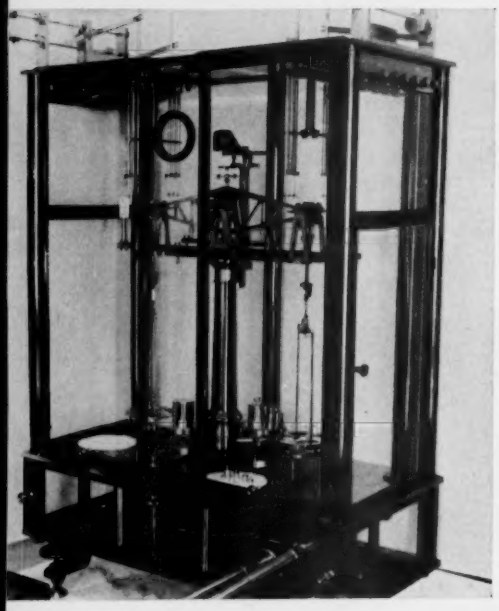
"I have long been convinced that ultimately the United States must shift to the metric system," Strauss told a meeting of the American Physical Society meeting in Washington, D. C. last spring.

Strauss has since lost his bid for confirmation, but the question of the metric system remains very much alive in Washington officialdom.

Actually the issue has been cropping up with varying degrees of heat ever since the nation was founded. Thomas Jefferson studied the issue briefly and indicated some favor toward the metric system. John Quincy Adams went into it in more detail a few years later and suggested that the country

This woodcut, reproduced from "Geometrye" written by Jacob Kobel in 1575 shows how the Germans prepared a standard "rute" an early measurement of length which corresponded to the British rod. The standard was arrived at by selecting men in a random manner as they came from church and by dividing the over-all length into sixteen equal parts to average the longer and shorter feet.

Standards of measurement are of vital concern to industry. Shown here are various gage blocks and ring gages used by industry and some of the equipment used by the National Bureau of Standards in calibration of the standards.



◄ The most accurate of the precision balances at the National Bureau of Standards is used to compare the national standard kilogram with other secondary standards of mass. The balance is operated entirely by remote control to avoid errors due to heat given off by the human body.

The U. S. national standard of length, a meter bar of platinum-iridium, is removed from a special carrying case in which it was taken to France for comparison with the international standard. At the left is Dr. Lewis V. Jordan, chief of the National Bureau of Standard's Length Section. On the right is Benjamin L. Page, who is responsible for comparing the bureau's working standards of length with the national standard meter bar. ▼

consider the possibility of adopting the metric standards.

But, it wasn't until 1866 that Congress got around to legalizing the use of the metric system. The act simply made the meter a legal standard, but did nothing to make it obligatory.

In 1902, Congressman Southard introduced legislation which would have placed the country on the metric system. Alexander Graham Bell and Samuel W. Stratton, first director of the National Bureau of Standards, among others, gave support to the bill, but the legislation failed to gain approval.

Today, the U. S., Britain, and the Commonwealth nations are the only countries that still rely on the inch and the ounce. In just the last year, India and Japan dropped their own systems and picked up the metric units as their basis for measurements.

In reality, the U. S. has already adopted much of the metric system through a process of evolution. Even the slide rule and the desk calculator, common tools of the engineer, are metric in nature. And the English system has given way to the metric standards in virtually every field of science. The chemical and electronic industries make widespread use of the metric system and recently the pharmacuetical manufacturers converted all of their packaging to the metric standards.

But, important areas such as civil engineering and large segments of industry remain tied to the English system. In fact it is not uncommon for an engineer or technician to be required to deal with both measuring systems on the same job.

THIS double system, proponents of the metric system claim, leads to unnecessary confusion and difficulty. Confusion, which they say, the U. S. can ill afford in a world increasingly dependent on exact mathematical skills.

The pro-metric group believes that adoption of the system would provide the country with a simple uniform system—a system which meshes into multiples of 10's—and at the same time place the U. S. in accord with most of the rest of the world.

Mr. Strauss and other leading advocates of the metric system have expressed concern that the English system is hurting our foreign trade. People, long accustomed to buying and selling in kilograms, liters and other standards of the metric system, are confused when they are suddenly confronted with U. S. packages labeled in English pounds and gallons. On the other hand, Russia, fast becoming a major competitor in many areas, is firmly entrenched in the metric system. This fact, the metric backers contend, gives the Soviets an unnecessary advantage in competition for the world's markets.

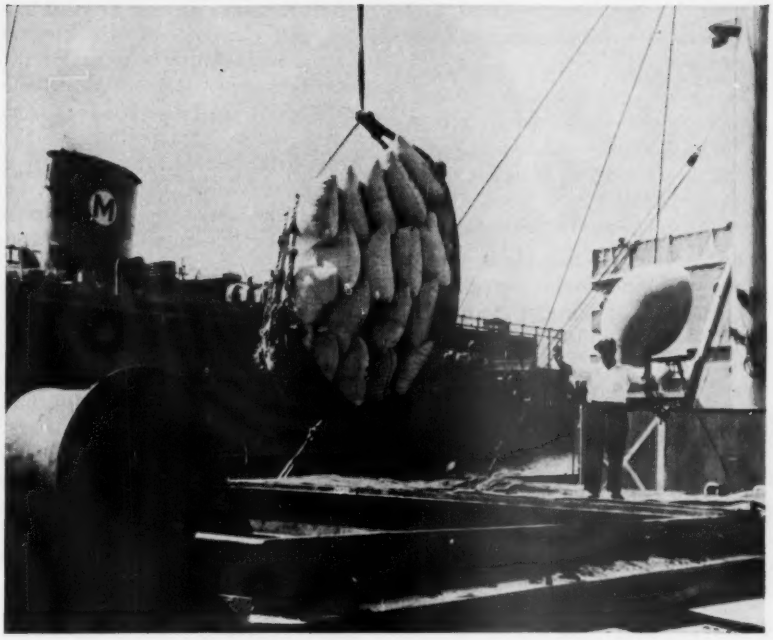
In December, 1957, a committee appointed by the American Association for the Advancement of Science to study the metric system remarked on the foreign trade aspects of the controversy:

"We have discovered genuine concern (bordering on alarm) by experts in foreign trade over the failure of our manufacturers and packaging concerns to explain contents, dimensions and similar items in terms of metric units in catalogs, specifications and on labels."

The same argument is often advanced concerning our efforts to spread technical knowledge in underdeveloped countries. Our experts, brought up on the English system, are often confronted in these foreign countries with a variety of instruments all calibrated to the metric system. And then to further compound the confusion the instruments and tools we send along with our technicians are usually marked in the English system, adding to the already difficult task of trying to sell our technology.

Many believe that technical training in the U. S., likewise, would be improved if the simpler metric system were adopted. They back up their arguments by citing the amount of time that is wasted on conversion tables and in daily laboratory conversion processes.

Even the space age has invaded the controversy. Backers of the metric system believe that the demands of space exploration make it almost mandatory that a simpler more universal form of measurement be adopted. For example, they point to the difficulty of converting speed into terms of feet per second at truly high velocities. Computer techniques, which are becoming part of our everyday life also are demanding efficient systems of measurement.

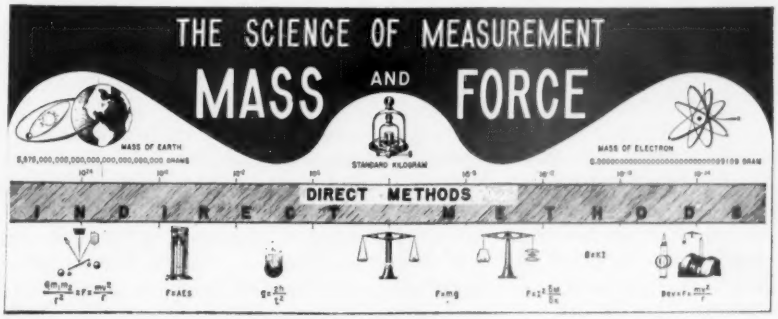


Is foreign trade being hurt by our insistence on the English standard of measurements? Proponents of the metric system claim that goods labeled in pounds, ounces and gallons are confusing to our foreign customers who have long been accustomed to dealing in the various metric measures.

Despite these arguments, the fact remains that the English system is deeply embedded in much of our culture and attempts to uproot it are not meeting with unanimous enthusiasm.

For much of our country, the change, especially if it were attempted overnight, would be costly. This is particularly true in industry where machine tools, equipment, containers and other like items would have to be abandoned and replaced with tools of metric measurement. Textbooks would have to be rewritten and instruments recalibrated.

AND probably more important, the public would have to be thoroughly re-educated. It might take a long time for the average American motorist to become accustomed to



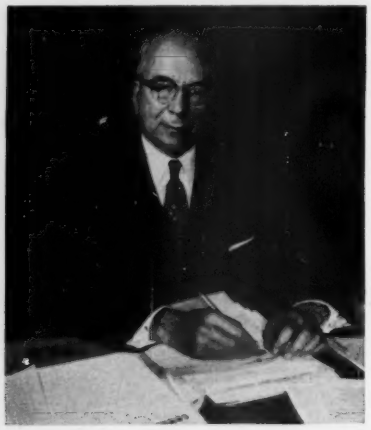
Measurements of mass and force extend over a tremendous range—from the mass of the earth at the left of the chart to the mass of the electron at the right and from the 10-million pound force exerted by the NBS's giant testing machine (second from lower left) to the small forces exerted by atomic particles. All such measurements in the U. S. are based on the national standard of mass, a kilogram cylinder (center of chart) kept behind locked doors at NBS.

buying his gasoline in liters and the housewife her potatoes in kilograms.

Many of the opponents of outright adoption of the metric system contend that two systems of measurement can easily coexist with each finding its own level of acceptance throughout the world.

Efforts have been made in recent years to refine some elements of the English system by removing some of the minute differences in definitions. One of these moves came last winter when all of the national standards laboratories of the English-system countries agreed to define the inch as 25.4 millimeters. Until that time the official definition of an inch in the U. S. was 2.54000508 cms, while the British used a definition of 2.53999560.

However, there are a number



Lewis L. Strauss, while acting Secretary of Commerce, reopened the controversy over measurements by recommending that the country shift to the metric system. Strauss later lost his bid for confirmation, but his suggestion is still very much alive in Washington.

of differences still existing within the English countries. For example, the U. S. gallon is about 231 cubic inches while the British gallon commonly referred to as the Imperial gallon is equivalent to 277.42 cubic inches. The British ton is 2,240 pounds while the U. S. uses what is known as the short ton of 2,000 pounds.

Actually the U. S., although it is an English system country, has no primary standard either of length or mass in the English system. All elements of the English system are defined in terms of the metric system. (For example the inch equals 25.4 centimeters.) The United States Prototype Meter No. 27 and the United States Prototype Kilogram No. 20, both located behind locked doors in the National Bureau of Standards at Washington, D. C., are the primary standards of mass and length in the country.

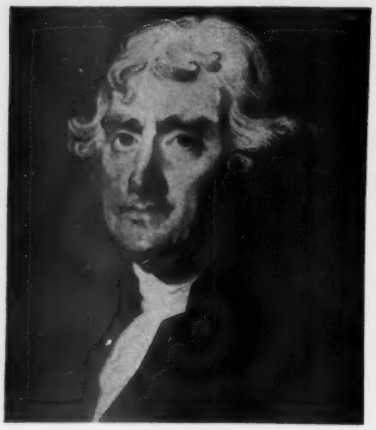
The NBS standards are based on standards maintained at the International Bureau of Weights and Measures in Sevres near Paris, France. The International Bureau was established in 1875 at an international metric convention called to insure "the international unification and improvement of the metric system."

THE essential features of the metric system as it is known today were embodied in a report made to the French National Assembly by the Paris Academy of Sciences in 1791. The adoption of the metric standards was relatively slow but today the system is either obligatory or permissive in every civilized country of the world.

Man has been toying with various methods of measurement ever since prehistoric times. Many believe that the first units used by primitive man were those of length and weight with the units of area and volume and capacity coming much later. According to the Bureau of Standards, the early measurements were derived from the size of the limbs of the human body such as the length of the foot or the width of the palm. Units of weight included those of kernels of grain and shells.

One of the earliest units apparently was the foot. First, this was the length of the foot without any further specification or modification. Later this became the length of the foot of various rulers of tribes and groups of people. This slowly evolved through the Egyptians, Greeks and Romans and today is defined in the U. S. as one-third of a yard.

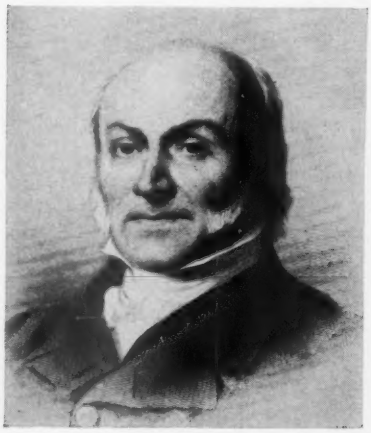
The inch, the Bureau of Standards reports, was originally a thumb's breadth. In the Roman



Thomas Jefferson was one of the first national figures to suggest the possibility of the country adopting the metric system as its standard. Controversy over the relative merits of the metric and English systems has been going on ever since the nation was founded.

duodecimal system it was defined as one-twelfth of a foot and was introduced into Britain during the Roman occupation where it became a part of the English system of weights and measures.

This evolution of the world's measurements has taken place slowly over centuries. Today, proponents of the metric system believe the evolution should logically be pushed one step further with the adoption of the metric standards by the entire world.—**End.**



John Quincy Adams explored the metric system thoroughly and recommended that the country consider the adoption of the system. But, it wasn't until 1866 that the U. S. got around to legalizing the measurements.

FROM WASHINGTON

BY
MILTON F. LUNCH,
N.S.P.E.'s Legislative Counsel

THE ATTACK ON CONSULTING ENGINEERS

Whether by coincidence or conspiracy (as some people seem to think) a series of separate, but related, official reports have lately become the serious concern of consulting engineers, and thereby of the engineering profession. Read together, these reports and comments from governmental sources seem to say (1) that the Government is using consulting engineers too often, (2) that the fees of consulting engineers are too high, and (3) there is not enough control over the consulting engineers in his design of the project from a construction cost standpoint.

◄ Senator Hayden

Rep. Cannon ►

The current wave of criticism had its first known origins in the House Appropriations Committee report on the Interior Department funds for 1960 through a proviso limiting engineering and design costs to five per cent of the construction cost of the project. The Committee report did not really explain its decision except to complain about "excessive costs . . . in the planning and construction of employee housing and other facilities." It added, significantly, however: "The Committee feels strongly that a return to simple, standard, inexpensive construction is long overdue and expects each agency involved to take prompt action to eliminate special requirements and unnecessary frills." It said it was to this end it had placed the limit on engineering and design costs.

Following vigorous protests by NSPE and other groups against the unrealistic and harmful idea that engineering and design costs could in all cases be held to a rigid maximum of five per cent, the Senate Committee, headed by veteran Senator Carl Hayden of Arizona, eliminated the five per cent limitation. Senator Hayden, who also chairs the Interior Subcommittee, commented in the report that his group "is in complete accord with the House Committee intent of reducing excessive engineering and design costs . . ." but agreed with the NSPE point that such an arbitrary limitation could result in increased construction costs.

The conferees upheld the Senate position and the professional societies had thus scored a "victory." In view of later developments, however, it may be fair to assume that the "victory" only generated further interest and efforts to "crack down" on consulting engineers. The situation is possibly not unlike that described by King Pyrrhus in 279 B.C.—"Another such victory . . . and we are undone."

During the five per cent battle, the House Subcommittee on Public Works Appropriations, headed by Rep. Clarence Cannon of Missouri, who is also chairman of the full Committee, released the hearings on funds for civil functions of the Army. Rep. Ben F. Jensen of Iowa, ranking minority member of the Subcommittee, undertook a vigorous attack on Corps of Engineer witnesses for engaging A-E firms for some of the Corps' engineering design work. In one instance he was particularly critical of having an outside engineering firm do the design for a bridge in the Honolulu area. Rep. Jensen argued: ". . . but you folk are supposed to be professional men in the art of designing and building bridges. You are engineers. Are we to understand that there is nobody among all of the officers and enlisted men in the Army Engineers that is capable of designing such a bridge . . . Why I would feel, if I were you gentlemen, it is a rank insult

for anyone to say that among all of your engineers there is not one capable of designing a bridge of this kind or any other kind."

The Corps witness explained the well-known (to engineers) principle of having a design staff geared to average annual workload and the inherent economy and efficiency of using outside firms for additional needs and special projects. It was also explained that otherwise the Corps staff would vary in size at a great rate depending on the workload. But Rep. Jensen regarded the answer as an "alibi," and renewed his attack on hiring outside firms.

◄ Rep. Jensen

The Iowa legislator, who is generally known as a conservative in his political thinking, said he assumed the Honolulu bridge design would cost at least five per cent of the $1,940,000 construction estimate. Later the Corps supplied the actual figure which turned out to be $61,980, or 3.2 per cent. Earlier in the hearing a Corps witness said that engineering and design costs run about eight to ten per cent of the construction cost, plus an equal amount for supervision and administration—or an approximate total of fifteen to sixteen per cent for engineering, planning, administration and everything other than construction. Every consultant who had had this testimony brought to his attention had said, somewhat wistfully, "I wish we could get eight to ten per cent for engineering design work for the Corps or any other government agency."

In June the ranking House members of the Appropriations Committee, including Chairman Cannon and Rep. Jensen, returned to the attack with a comment in the conference report on the Interior bill that they were "concerned about the excessive engineering and design costs being incurred on construction projects and directs that the Bureau of Indian Affairs, National Park Service, and the Forest Service thoroughly review present policies, practices, and staffing and submit to the committees in connection with the 1961 budget a complete report . . . ." Then Chairman Cannon's report on the Public Works fund bill added the direct blow: "The Committee is concerned about the increasing practice of contracting survey and design work to private engineering firms. An investigation of the need for and the extent of the practice is being undertaken and it is expected that the Departments involved will be prepared for extensive hearings on this matter in connection with consideration of the 1961 Bill."

Aside from the powerful Appropriations members, the House Committee on Post Office and Civil Service has been critical, in general, of contracts with private firms for work which could be performed by employees of the Government.

The latest knock came not from Congress, but from an arm of Congress—the General Accounting Office. In a report to Congress on the Bureau of Public Roads, the Comptroller General had some harsh words on the use of percentage of construction as the basis for the engineering fee which, he said, serves as "an incentive for consultants to prepare elaborate plans and specifications and design expensive structures to increase their fees." The GAO report said the recent average fee was at four per cent and noted that one fee had amounted to $3,655,000 for a single project. There is no apparent recognition in the report that most of this necessarily went into salaries and other expenses, the implication being that the consultant had pocketed the large sum in the same way a doctor or lawyer pockets the full fee except for relatively minor overhead costs. The GAO favors the setting of a reasonable maximum fee, and the Bureau of Public Roads has undertaken a study of revisions to its consultant contracting policies.

L. M. Van Doren ►

All of this, and more, has aroused the consulting engineers of the nation into action. The NSPE Functional Section for Consulting Engineers in Private Practice has undertaken a major effort through a Task Force on Government Contract Relations, headed by L. M. Van Doren, P.E., a consulting engineer from Topeka, Kansas, to assemble the full facts and prepare a thorough and documented study for the Congressional hearings next year. Among the projected activities are a survey of consulting firms to get the **facts** on actual fees, rather than fanciful ideas which some critics seem to have, a complete explanation of the services covered by the fee and the costs related to that service, reasons why it is often more economical and efficient to use outside consultants and the relative and comparable costs of a governmental office providing the same service. The latter is a difficult and tricky point to pin down. A task force of the Hoover Commission in 1955 established service costs as a per cent of construction costs among Federal agencies, ranging from 5.23 for the Atomic Energy Commission to 17.0 for the Bureau of Reclamation. The NSPE study will undoubtedly recite this evidence in detail and suggest that Congress, if it wants a fair evaluation, should have the 1955 study updated.

The next twelve months may set the pattern which will govern some basic policies of an expanding governmental public works program for years to come—inclusion of private consultants as part of the team necessary to build the United States, or a drift to an all-governmental operation through civil service employees. If consultants do not fight back now they may find it too late when the changed policy hits them directly.

Special Section . . .

CONSULTING

- "Duties and Responsibilities of a Principal in a Consulting Engineer Firm"—page 29.
- "Let's Be Realistic on Fee Schedules"—page 31.
- "The Functional Section in Proper Perspective"—page 34.

GOVERNMENT

- "Legal Problems in Serving the Needs of Government Engineers Through the Professional Society"—page 36.
- "Ethical and Professional Problems Created by the Mayor's Executive Order #49"—page 38.
- "Problems in Classifying Engineering Positions"—page 40.

Duties and Responsibilities of a Principal In a Consulting Engineer Firm

By

J. L. BREEZE, P.E.

J. L. Breeze Associates, Santa Fe, N. Mex.

THE purpose of this paper is not an attempt to tell engineers in private practice how they should run their offices nor is it intended to be merely a cataloging of the obvious duties and responsibilities common to principals in any profession. It is, however, an effort to emphasize the broadness of scope occupied by the obligations which await the engineer who enters private practice. This paper is presented with the hope that by focusing attention on some of the more subtle obligations found in consulting engineering, valuable thought will be stimulated in the minds of veteran consultants as well as engineers and engineering students who are considering private practice as a goal.

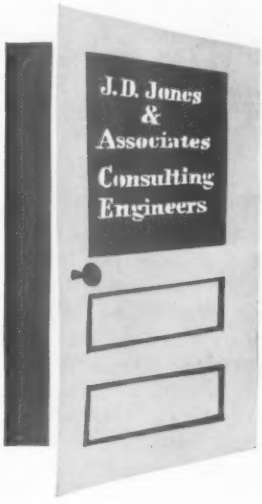
Four areas of responsibilities will be examined in this paper, namely (1) the consultant's obligation to initiate and maintain throughout his career a self-education program of broad scope, (2) responsibilities to his clients, (3) responsibilities to his profession, and (4) responsibilities to the public.

Self-Education

Few people enter a profession with as meager an academic background for private practice as do engineers. This is not a criticism of the technical curricula offered by recognized engineering colleges; rather, it is an observation of the fact that while most students of law, medicine and architecture are thinking in terms of eventual private practice, a great many engineering students are oblivious of the existence of the private practice of engineering.

Those who enter private practice, even as apprentices in large firms, should soon be aware of the educational gap which separates them from positions of heavy responsibility. They will find, maybe to their surprise, that the duties and responsibilities of the principals in the firm loom as large in the fields of civics, business administration, economics, and human relations as they do in the purely technical field on which the firm is founded.

As examples, the civil consulting engineer who is not well aware of the mechanics of local government in the municipality he hopes to have as a client may well never get the chance to demonstrate what technical prowess he may have to that particular community.



The consulting engineer who forgets that he is also a businessman may be initially pleased with the volume of work which comes his way. But, like the celebrated used car dealer who took a loss on every sale with the hope of making it up on volume, this consultant is heading for a very disappointing experience.

The consulting engineer who cannot learn engineering economics, or who places himself above it, is either in the wrong line of work or he is retained by extremely remarkable clients. The phrase "cost is no object" is one that rarely falls from the lips of any client. Here, however, the consultant must recognize one of his most important functions. He must learn to formulate a realistic budget for the work which must be done and, as is often necessary, convince the client that this figure is what is required for the class of job in question.

Finally, still in the area of self-education, the transition from a schooling in absolutes to the wonderland of mercurial human behavior may well present the toughest assignment in self-teaching that a consulting engineer must face. In this land, he will attend conferences which resemble the Mad Hatter's tea party, he will be at bid openings where the owner's rage may rival that of the Queen of Hearts, and he will find that contractors, when they are needed urgently, can vanish as mysteriously as the Cheshire Cat. It is difficult to suggest the nature of self-study which would be required to prepare an engineer for these experiences. Perhaps the liberal education required by boldly walking into this wonderland is the best that can be expected.

Responsibilities to Client

The consulting engineer's practice, like architecture, differs markedly from law or medicine in that a great deal of the work turned out by engineering firms is actually produced by sub-professional employees. This is understandable in view of the fact that so much of the work necessary to express an engineering concept is routine and repetitous; however, this situation does present a special problem to the principals for as their organization grows, they can easily lose contact with the designs going out under their names. When this happens, they are violating the fundamental concept of professional practice, namely the personal attention to detail expected of the practitioner by his client. There is no reason to suppose that a large firm will necessarily fail in this respect provided that the principals never lose sight of this obligation to their clients.

While the patients of doctors or the clients of lawyers are normally content to let those practitioners do the thinking, it seems that many clients of engineers feel well enough qualified to insist on having their own ideas followed. Perhaps this attitude stems from the myth that all Americans are born with engineering ingenuity; or, more likely, it may arise from the fact that, as a profession, we have not yet achieved sufficient stature to instill complete confidence in our prospective clients.

Allowing that a client may well have some valuable ideas, it is more often the case that the consultant must possess the strength, skill and diplomacy to ease the client's thinking back to a true engineering approach to the problem. This may well be the most important period in the engineer-client relationship, for it is here that he has the opportunity to win the client's confidence and thereby create a climate much more conducive to producing a good job. Those who will not assume this responsibility may spend their career merely detailing and sealing client-designed jobs.

Invariably, the cost of a project is very definitely an object from the client's point of view. Therefore, designing within a client's budget becomes an important responsibility on the part of the consultant. Almost as often, however, the client has grandiose ideas of what can be accomplished within the stated construction budget. It is in these cases that the consultant has the grave duty of pointing out just what can and cannot be had within that budget. Some consultants, perhaps those with a flair for salesmanship, often emerge from budget conferences with larger building allowances; many of us, however, are forced to apply Procrustean methods to fit the job to the budget. In all events, it is of utmost importance at this point that the client be made fully aware of what he will be getting for his money.

Since the consulting engineer's responsibilities to his clients involve engineering economics to such a great extent, a few words on that subject should be included here. Many of us often complain bitterly that we cannot do the job we would like to because of budget limitations. Those of us in interprofessional practice have known dark moments of despair when cuts must be made and the client's trembling finger points first to the engineering phases of the building. But, with all the frustrations arising from budget limitations, it is the writer's opinion that better and more ingenious engineering will be found on tightly budgeted jobs than is evident on many cost-is-no-object government crash programs.

Responsibilities to the Profession

The bane of any profession is fossilization. All the older professions have suffered through periods of painful mediocrity where established precedent held sway over modern concepts. The consulting engineer's responsibility to continually help advance his art may not always seem clear to him, particularly if making money for the least expenditure of intellectual effort is foremost in his mind. Also, consultants are often frustrated in their attempts to produce advanced designs by clients who distrust anything that has had less than fifty years of proved merit.

Yet unless consulting engineers do assume this responsibility and find ways to use advanced ideas when the design conditions warrant them, they may as well turn the design work back to the manufacturers whose "free engineering" services consultants have so vigorously deplored.

The consultant who does not read at least the important articles in the abundant supply of professional and technical publications available is missing out on one of the easiest ways to keep abreast of current engineering thought. The

usual excuse given for dodging this duty is that there is not enough time; and the worst part about this plea is that it is true, at least so long as consultants organize their time in such a way as to exclude everything except a day full of pure reflex activity necessary for the production of work and the meeting of deadlines. The point is that time for reflection and study of new designs must be recognized as an important part of the consultant's working hours.

Responsibilities to the Public

Since the general public has apparently never heard of a consulting engineer, it may seem to the consultant that he has no responsibility to this body. Such is not the case. Whether it knows anything or not about engineering, the public licenses engineers, votes money for public construction, and writes into law all manner of codes and regulations with which the consultant must conform. Clearly it is to the best interest of all concerned if consulting engineers play some part in guiding these public efforts. Serving on registration boards, cooperation with public housing officials, and work with code committees are all excellent ways of carrying out this responsibility to the public.

This paper has touched briefly on some of the consulting engineer's duties and responsibilities which, perhaps in the rush to meet deadlines, may often be neglected by many of us.

To those who may feel that some of the activities mentioned here are superfluous and do not contribute to the income of an engineering firm, the thought is offered that these seemingly unprofitable activities are essential to a strong, progressive and respected profession. Therefore, when the principals of a consulting engineering firm devote some of their time in this manner, they cannot help but strengthen the reputation of their own firm. If it is thought that engineering firms cannot afford the time necessary for such activities, then there is an indication that our fees have not been set high enough to support a truly professional practice.

Finally, to those who are considering entering private practice, this paper has attempted to show what will be expected of them by their clients and the profession. The technical duties and responsibilities required of a consulting engineer have been purposely left out of this discussion in an effort to stress the intangible requirements of private practice—requirements which otherwise may have escaped consideration.

If this paper accomplishes no more than to create an awareness of the broad nature of the duties and responsibilities of a consulting engineer, it will have served its purpose.—End.

Let's Be Realistic on Fee Schedules

By

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IT IS the purpose of this discussion to put into focus certain considerations of the business side of engineering practice. *The Summary of Manuals of Practice* recently published by NSPE presents the factual information, outlines of practice and range of percentage rates as given in state society fee schedules and manuals. It is intended to be of service as a reference and does not include major recommendations or proposals for changes.

Reference is made to the summary report for background but the observations and comments in this present discussion are my own and they may or may not reflect the views of the task force responsible for the preparation of the report.

Review of the numerous manuals and consideration of the Summary Report points to three facets of this subject that should be given more attention in the preparation of fee schedules: First, the primary field of application of percentages; second, the areas in which percentages do not apply; and third, the confusion of combining elements of charges in one curve.

Two Bases for Charges

Although there are several widely recognized bases for the computation of engineering fees or charges, it is well to note that they are essentially modifications or combinations of just two basic plans: First, the actual cost of salaries for the time devoted to the project, plus a percentage for overhead and profit, and second, a lump sum or fixed fee, determined in advance, for the complete work.

In between, there are bases such as retainer fees, actual payroll and overhead costs plus a fixed fee, actual cost or a lump sum for preliminary services plus a percentage of construction cost for design, and others. Greatest interest in the numerous published fee schedules, and probably the most extensively used in numbers of contracts for work, are the charges based on percentage of construction cost.

Percentage of construction cost fees are effectively lump sum or fixed fee in nature, since the charges to the client are determined in advance by the stated percentage and the size of the particular project, and not by the actual cost of performing the particular services. That leads to the wide interest in finding a formula for the percentage rate to be used. It is natural to hope that there may be some mathematical ratio or rate or curve to apply to some base.

Percentage of Construction Costs

Historically, the percentage of construction cost bases has appeared to be fair and fully adequate in its principal field of application. It has been used most extensively for civil engineering projects and in architectural work during several decades of practice. The degree of similarity in the cost for each type of project—to prepare drawings and specifications for buildings, highways, water distribution,

etc.—serves as a basis for percentage rates to apply to future work of the same general nature in each of these specialties.

Fee schedules for these types of construction bring together the information that preparation of plans for a certain $500,000 bridge construction, for example, may be expected to cost in the order of $25,000. This is expected because numerous other bridges of a similar design have required five per cent of the construction cost to compensate for the design plans. The rate may be six per cent or 4.5 per cent or seven per cent on another type of bridge, or on a building or other facility.

The first problem in this concept of fees comes when an attempt is made to generalize or reach across a broad range of engineering projects. Numerous committees have made sincere efforts to bring together from surveys, questionnaires and experience a summary record of percentage values. A major factor contributing to the wide variation in the results, as indicated in the summary report, may be the particular examples considered as "average" or "typical" in reviewing the costs in each of the surveys or committee studies.

One or two columns of percentage values are expected to apply to the repetitive nature of the listing of "simple bridges" or "complicated bridges" and then to be expansible to cover almost any type of construction. Many fee schedules include in one list, airports, power plants, street lighting, sewage treatment, communications, chemical plants, reservoirs, industrial buildings, and so on, to appear to cover almost any type of construction.

Architects have pointed to a more realistic approach by listing their work under at least five columns of recommended fees, with warehouses, apartments, hospitals, churches and residences as leading examples in each of the five types of buildings.

There is a real danger involved in the attempt to include a broad scope of examples under one or two basic percentage rates, since it can be very misleading to have it appear that the cost of engineering are so easily determined for anything that may be built. Probably engineers need some more columns to cover the range of projects from airports and bridges to water works

and zoological gardens. The problem is not as much concerned with percentage values as it is with descriptive words to relate the values.

Where Percentages Fail

The concept of percentages to relate the cost of engineering to the cost of construction is primarily based on records in the use of concrete and steel and other civil building materials. This successful history does not, however, confirm that the same relationship can be extended directly into developments involving a large variety of machinery and major equipment. Large airport facilities, chemical processing plants, high pressure steam-electric generating plants, major water supply developments, and oil and other refinery plants are some examples of nonrepetitive facilities that require detailed comparisons and special studies. Development and appraisal of relatively small components and arrangements within a framework of the total design calls for changes from one project to another, with numerous possibilities for comparison.

Multimillion dollar construction costs are often involved and as much as half of the final plant investment may be in a few items of major equipment. The cost of engineering usually depends largely on the studies of details of arrangements and selection of particular items of smaller equipment, such as pumps, blowers and controls. Equitable charges for these engineering design services cannot be based on a percentage fee formula when the costs of widely varying amounts of major equipment are in the base.

Penalty on Development

By its nature, percentage penalizes the consultant financially whenever he efficiently reduces the client's construction cost on a project. For example, by comparisons and developments, an engineer may spend $5,000 to save $50,000 of construction and equipment cost. Then, instead of collecting the $5,000, he reduces his own fee by some percentage of the $50,000 reduction. Such a possible resulting effect is not realistic, does not lead to good professional practice, and is not good business. General practice does not and cannot follow "average" or "basic minimum" values of fees in contracts for these engineering services and the fee schedules and manuals should not give that impression.

However, that does not mean that general figures are not useful. The value of percentages may very well be recognized and accepted as a basis for general comparison and for an estimate of possible cost for discussion purposes. It is well to know that the engineering cost of a certain type of plant may have been five per cent of construction cost, even though the next one may be accomplished for four per cent. On the other hand, the next job may introduce enough factors that six per cent or seven per cent or higher is quite reasonable.

Actual Cost Basis

The most equitable approach in contracting design services of this kind is to base charges on the actual engineering cost as it is incurred. However, being realistic also means recognition of the possibility that open-end charges can lead to abuses and, also, time needed for some comparisons may not be as successful in reducing costs as suggested in the example above. The agreement may include an engineering cost estimate for a particular project and a form of limitation often used in contracts is the provision for cost-plus-percentage on direct charges, plus a fixed fee based on the estimated cost. Based on experience, an engineer may then find a percentage helpful in estimating for a job which he deems to be quite similar to previous work in the scope of services required.

Here the experience and reputation of the engineering organization in the particular field of development is the primary consideration. Of major importance is the final cost of the project, and that may be measured in plant efficiency, or in dollars per kw or per million gallons of output, or in other ways.

Only three of the manuals reviewed for the Summary Report outline special or more complex design as a classification which is not included in a basic or minimum percentage fee schedule. More definite reference is needed to clarify this area of engineering service, if the manuals of practice are to serve as a guide to assist engineers and their clients.

An additional matter needing attention is the basis of "actual cost" in the cost-plus-percentage charges. As noted in the Summary Report, only six manuals include definitions and two of them differ from the other four. The summary figure for overhead and profit expressed as a percentage for addition to the salary or payroll cost depends on the accounting arrangement for allowance for "fringe benefits." This needs clarification as helpful information.

Complex Rates by Combination

All of the published fee schedules are particularly concerned with percentage rates for application to construction costing less than one or two million dollars. Engineering costs are indicated at a higher percentage of total construction cost on smaller projects, and the percentages decrease with increase in construction cost. There is a wide variation among the schedules for rates at lower construction costs, and the values approach closer to similarity for higher construction costs.

The familiar pattern of these percentage rates is, for example: 9.5 per cent on construction cost at $100,000; 7 per cent at $200,000; 6.2 per cent at $300,000; 5.75 per cent at $400,000; 5.5 per cent at $500,000 and so on to 5 per cent at $1,000,000. By note or a curve, or by inference, the rate is then interpolated to be 6.6 per cent on a construction cost of $250,000, and similarly for other intermediate steps.

Percentages in these schedules, so exactly stated, seem to indicate some kind of a mathematical relationship. Actually, the columns of values and the curves show simply the combination of a relatively fixed amount plus a variable. The costs of engineering have the two principal components:

First, an initial or base cost, which includes preliminary consideration, estimates and outline of the project, the time of personnel to become familiar with the general plan, and the overhead costs associated with the business arrangements for the new assignment. Within rather broad limits, these initial or preliminary costs are relatively independent of the construction cost.

Second, after the initial and preliminary steps are completed and the detail plans and specifications are started, the costs of engineering design and the assistance during construction are generally in a direct relationship with the construction cost at percentage rates which depend on the type or class of construction.

Recognition of these two significant cost components in an agreement for services results in a two-part fee of: (1) per diem or engineering cost, or an appropriate lump sum based on the engineer's estimate, for the preliminary services; and (2) a flat rate percentage for design services. For example, a lump sum of $5,000, plus a rate of 4.5 per cent of construction cost will give the same results as the percentage rates in steps noted in the example above (9.5 per cent, 7.0 per cent, 6.2 per cent, etc.)

Probably this straightforward method of determining charges is actually used more extensively than would be indicated by a review of the suggested fee schedules. The preliminary or initial fee is, of course, subject to variation to fit the circumstances, and the percentage for design may be another rate for the class of work.

Use of this basis or a block-step type schedule is suggested as an alternate for more extensive adoption in manuals of practice. It appears to be a means of simplifying and clarifying the percentage of construction cost fee schedules by elimination of the need for small step variations and interpolations of percentage rates.

The Client's Viewpoint

Manuals of Practice offer an especially important opportunity to be of service to clients as well as to consulting engineers. They may serve as a guide to assist in preparing the outline and scope of services and the general conditions in agreements for engineering assistance.

The client's viewpoint is of primary consideration and a well presented statement of principles in the conduct of professional assignments can be most helpful in promotion of such services and in public relations. The prospective client needs this information for a general idea of the basis of costs and of his obligations as well as the services he may expect. Concentration on percentage rates must not be permitted to detract from this function of manuals.

The major conclusion of this discussion is that realistic management of the business aspects of consulting engineering practice is too complex for full reliance upon any set of typical or average fee rates. Charges for engineering services must be adequate to compensate for the costs and to provide a fair profit. That is as necessary in engineering practice as in other good business relationships. Fee schedules can be useful as a guide to assist, but not to replace, business management.

In extending activities of the several committees engaged in preparation or revision of manuals of practice and fee schedules, it is suggested that:

- **More classifications of typical projects should be outlined, including reference to a class of work to which standardized rates may not apply.**
- **More information should be included with reference to cost-plus-percentage bases.**
- **Values should be developed for two-step or another type of rate as an alternative to the more complex curve-type rates.**
- **Additional attention should be directed to the client's viewpoint, with information to assist in discussion and negotiation of projects.—End.**

The Functional Section in Proper Perspective

By

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THE Functional Section for Consulting Engineers in Private Practice was formed with the consent of the NSPE Board of Directors, in June, 1956, at Atlantic City. There was considerable discussion at this organizational meeting concerning what should properly be the aims and objectives of this new Functional Section, and it was finally agreed that it should in fact provide a forum for discussion of all problems confronting the engineer in private practice, both at the employer and employee level.

In the organization of the Section, it was, of course, recognized that the participants of the section would be any member of NSPE whose major source of income was derived from private practice. And here it is important to recognize the use of the word *"participant"* rather than *"member."* This designation was chosen because "membership" would imply a much more formal organization than was contemplated, and might in fact lead to an organization within the Society with all of the unfortunate possibilities of conflicts of policy, independence of action and possibility of "splintering," should such conflicts fail of resolution.

It was further recognized that should the work of the Section result in the need of action, that the greater prestige and resources of NSPE should be brought to bear on the matter to better insure success in such action, be it legislative, public relations or disciplinary in nature.

For these reasons it was established that no independent action would be taken by the Section, and that all actions would be referred to the Executive Committee and/or the Board of Directors of NSPE, who would accept, reject or refer back for further study any program proposed by the Section.

The Functional Section Executive Committee is made up of a chairman, a secretary, and six vice chairmen, one from each of the NSPE geographic regions. These officers are elected by the participants in attendance at the annual Functional Section meeting held in conjunction with the NSPE annual meeting.

With the formation of the Section, the duties of the Professional Practices Committee of NSPE were essentially taken over by the Section and by policy this Committee is now made up of the Functional Section Executive Committee.

At the outset it was recognized that the activities of the Functional Section might require supplemental financing over and above the capability of NSPE to handle, and the Functional Section, subject to the approval of the NSPE Board, is permitted to solicit donations for special purposes. This has in fact been done once in behalf of the American Thrift Assembly program and once to help finance the appeal cost in the *Lublin-McGaughy* case.

Problems Inherent to This Type of Organization:

The loose make-up of the Functional Section brings major problems in effectiveness into sharp focus. For one thing the lack of continuity in administrative offices leads directly to wide swings in matters of policy and fields of interest. This condition is contributed to not only by the personal interests of the officers, but to a large degree because the participants are unknown, and therefore their views cannot be felt by the Executive Committee, or by the members of the several task forces assigned to study various problems.

This lack of communication in both directions exaggerates all other problems because it directly affects the good the Functional Section can achieve. Without the views of the participants being communicated to the study groups, and, in turn, the findings of the study groups carried back to the participants, no program can be considered entirely effective.

Similarly it can be observed that with many studies carrying forward for several years, it is vital that a long-range program be evolved which can be followed from year to year until each study is completed and success achieved. Such a plan would not have to be inflexible to be worthwhile, but at least it would keep the program of the Section on the track.

Basic Principles for Guidance:

Of primary importance in the development of a program is to keep constantly in mind that the Functional Section is *entirely* within the framework of NSPE. By this is meant that no policy, action or field of endeavor should be contrary to the aims and objectives of NSPE, and this requires constant vigilance.

Participation in the Section program should be carried out on the basis of the individual member of the NSPE as contrasted to participation by engineering firms. This may be difficult, particularly when voluntary contributions are sought to finance the Section programs, and presumably these contributions would be largely from firms.

Finally, it is important to measure each proposed activity by the yardstick of professionalism. In this strong light it would be hoped that selfish and unworthy activities could be stopped at their inception.

Dangers of Diversionary Action:

It is easy to envision how the long-range aims and objectives of the Section could be diverted by:

- **Action initiated hastily by the pressure of a crisis. To offset this threat the Executive Committee**

must be constantly on guard and insist on full and deliberate consideration of such matters.

• Selfish action, favoring one group of engineers or the public over another, may be suggested from time to time and must be forestalled before it reflects adversely on the profession as a whole.

• Unilateral action without coordination and approval by the NSPE Board and/or interested committees. This danger is obvious in areas where the private practice view is only one facet of an overall professional problem.

Areas of Study

It is apparent that with a loosely organized Section as has been described, the primary activity will be limited to study groups, or task forces, and when such studies indicate the desirability of action, such action must be taken through NSPE. The results of these studies should also be taken back to the broad participating membership of NSPE by any means possible.

Some of the areas which have been suggested and which offer a real challenge to the Section are:

(a) Ethics in private practice, promulgation and enforcement.

(b) Fees, a realistic approach based on the facts of life.

(c) Salaries and working conditions of engineers employed by private practitioners, what they are and what they should be.

(d) Relations of the private practitioner with:

1. The public—a broad and effective effort is indicated.
2. The clients—how can relations with these most important people be improved.
3. The architects—both as a client and as a competitor.
4. The contractors—all is not sweetness and light here either.
4. The Government agencies at all levels should better understand the services we can render.
6. Other consulting engineering organizations, to aid and be aided by their work.

(e) Communications with our participants in state and local functional sections and at large should be improved in order to make our work worthwhile.

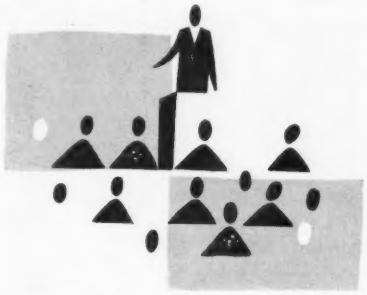
(f) Corporate practice.

(g) Package deals, are they good or bad, and under what conditions.

(h) Professional development of both the consulting engineer and his engineer employees.

(i) Quality of engineering, how can we improve the quality of our service to the client.

(j) Supervision of construction, should this be insisted upon as a part of design.



(k) Liability of the consulting engineer as reflected by recent court decisions, etc.

(l) Competitive bidding and related practices need further study.

From the foregoing it requires little imagination to realize the magnitude of the tasks that lie ahead. Whether or not significant advances can be made in any of the areas outlined is strictly dependent on how much effort and imagination is applied to the problem.

Legislative Action

The Functional Section must, along with the normal task force studies, be responsible for legislative action affecting the field of private practice and machinery should be developed to take the lead in recommending to the NSPE officers and directors legislation which we would like initiated by NSPE; legislation which we would like endorsed by NSPE; and legislation which we feel NSPE should oppose.

Recruitment and Proselyting of Employees of Consulting Engineers

Here we need clear-cut policies in regard to the attraction of young engineers to this branch of the profession which may to some degree overcome the shortage of qualified employees and minimize the evils of proselyting.

Courses of Disciplinary Action

In any profession there will always be the unethical, the dishonest and the unqualified, and the consulting field is no exception. Recognizing this, it seems logical that we should develop techniques to meet these conditions. Through the NSPE, the Functional Section should direct prosecution. Through the technical societies, NSPE should present the findings of the Functional Section to the appropriate technical society. In those states where the state boards of engineering examiners can act on malfeasance and misfeasance, NSPE should present the evidence through the affiliated state society. Direct legal action by injunction could be taken by NSPE in cases falling outside state jurisdiction, such as foreign practice or interstate activities with the consent of the state societies involved.

In summing up this paper, it must be restated that the problems only have been stated, and it is left up to the individual's imagination to suggest solutions. In the enormity of the task which lies ahead, it is most important that the Functional Section must remain in proper perspective, i.e., it must continue to be a "forum" for discussion, entirely within the National Society, and its program carried out by dedicated, not confused, participants.—**End.**

The three previous papers were presented at a meeting of NSPE's *Functional Section for Consulting Engineers in Private Practice* during the Society's annual meeting in New York City.

Starting on the next page are three papers given at a meeting of the *Functional Section for Engineers in Government Practice.* ►

Legal Problems in Serving the Needs of Government Engineers Through the Professional Society

By

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IN DISCUSSING the legal problems in serving the needs of government engineers through the professional society, we must look for some definitions and for some laws that affect the problem.

The Taft-Hartley Law, Sec. 2 (2), starts off by excluding from the term "employer" the United States, or any wholly owned government corporation, or any Federal Reserve Bank, or any state or political subdivision thereof. Since the Taft-Hartley Law does not apply to these employers, it does not apply to their employees.

The professional society can serve the needs of these employees principally by educating the employer—the legislators and the executive departments. It can offer testimony and recommendations and endorse legislation toward proper job classifications and pay schedules. This is constantly being done by the NSPE as far as Federal Government employees are concerned. The same service should be given by the state societies in the state and municipal government matters. This will require present committees to actively interest themselves in these matters or will require the formation of functional sections for that purpose. The second method of educating the employer is to request hearings and discussions with management on employer-employee matters as representatives of the professionals. This has not been done extensively up to the present time but progress is now being made in the formation of functional sections for that purpose. As long as no valid appointment of a labor organization representative has been made, the professional society should be within its rights to speak for its members with management.

In New York State, Article 20 of the Labor Law is known as the New York State Labor Relations Act. It was enacted in 1937. Under Section 715, the provisions of the article shall not apply to employees of the state or of any political or civil subdivision or other agency thereof. It has been held under that section that the statutory right conferred upon a charitable corporation (which is another exempt class) of exemption from the provisions of the section affected public interest and could not be waived or released by the exempt class. (*American Society for Prevention of Cruelty to Animals* v. *Geiger*, 1955, 208 Miscl. 29, 141 NYS 2d 610). In New York City, the mayor has seen fit to take the municipal employees of the City of New York out of the exempt class by his Executive Order No. 49. His Order establishes a so-called "Little Wagner Act" setting up collective bargaining and a procedure for the certification of a labor organization as an exclusive bargaining agent; the appropriate unit to be determined by the New York City commissioner of labor. The New York State Society of Professional Engineers has challenged this Executive Order in a proceeding now pending (*Matter of Department of Personnel*, Case No. R—36—58).

Until the legality of the mayor's Executive Order No. 49 is finally determined, we are faced with many legal problems in the New York City situation.

First: What is a professional?
Secondly: Should professionals and nonprofessionals be lumped together in the same unit and union?
Thirdly: How can the professional society act for its members?

The Taft-Hartley Act and the Administrator of the Federal Wage-Hour Law have a definition of a "professional," but neither the New York Labor Relations Act nor the Mayor's Executive Order No. 49 has a definition. It is this definition of a "professional" that has been the cause of many legal proceedings under Federal Law.

The Taft-Hartley definition of a "professional" (Section 2 (12) is clear and concise in characterizing the work as:

- **Intellectual and varied.**
- **Involving consistent exercise of discretion and judgment.**
- **Nonstandardized.**
- **Requiring advanced knowledge in a field of learning customarily acquired by a prolonged course of study in an institution of higher learning.**

The element of "advanced knowledge," as one of the descriptions of the type of work, means different things to the unions and to the professional societies. To the unions it means anything from a technical degree to years of experience, or a combination of education and experience, on an individual employee basis. Our National Society has filed a brief, as friend of the court, in the *Western Electric Company* case, now pending. (No. 2-RC-3594). It is hoped that a decision will be made that will lay down further principles in interpreting a "professional" along these lines:

1. **That the type of work is controlling;**
2. **That appropriate work groupings, rather than individuals should determine the status;**
3. **That advanced knowledge is a factor that is descriptive of the work and must be evaluated;**
4. **That the appropriate work group or unit must be composed substantially of individuals having college level degrees or have qualified for state registration in a profession;**
5. **That experience alone does not meet the requirement of the professional definition.**

So, there are legal problems in determining a "professional" and the mayor of New York City has refused to amend his Order so that it would define a "professional" or separate the professional from the nonprofessional.

Serious Problem

The problem of lumping supervisors, professionals and nonprofessionals in the same unit and union is very serious. The mayor's Executive Order No. 49 has no definition for a "supervisor" or a "professional" and no provision for a choice by those classes of employees as to whether they want to be included in a bargaining unit.

The Taft-Hartley Law, Sec. 9(b) provides:

"That the Board shall not . . . decide that any unit is appropriate for such purposes (that is, collective bargaining) if such unit includes both professional employees and employees who are not professional employees unless a majority of such professional employees vote for inclusion in such unit."

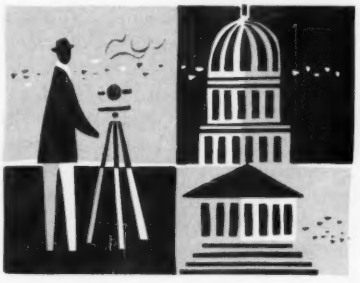
Under Sec. 2(11) of Taft-Hartley:

"The term 'supervisor' means any individual having authority, in the interest of the employer, to hire, transfer, suspend, lay off, recall, promote, discharge, assign, reward, or discipline other employees, or responsibility to direct them, or to adjust their grievances, or effectively to recommend such action, if in connection with the foregoing the exercise of such authority is not of a merely routine or clerical nature, but requires the use of independent judgment."

Under Sec. 2(3) of Taft-Hartley:

"The term 'employee' . . . shall not include . . . any individual employed as a supervisor . . . ."

The New York City Labor Department has rendered a decision under the mayor's Executive Order No. 49 which seems to have taken a step backwards in labor relations matters. (*Matter of Department of Sanitation*, Case No. R-5-58 and R-7-58). In the decision involving various levels of supervisory employees, known as "officers," employed in the Department of Sanitation, it is stated: "In the enforcement of our national labor policy, 'management' employees have been defined to mean 'executive employees who are in a position to formulate, determine, and effectuate management policies,' including labor-relations policy." Reference is made in that decision to the decision in the case of *Matter of Ford Motor Company*, 66 NLRB 1317, which was rendered during the time of the old 1935 Wagner Act, when the problem of managerial and supervisory employees was not of special concern in the Act. The New York City Labor Board entirely ignored the current national labor law and national labor policy when it seeks to confine the managerial or supervisory employees to the "policy making level." The effect of that decision is now evident in the



union certification case now pending affecting professional engineers in the Department of Personnel. When the New York State Society of Professional Engineers filed objections to the petition and alleged that all the employees in the unit are part of management and that a conflict of interest will exist, the reply served by the union alleged: "that all the employees in the unit are below the policy making level" and referred to the Department of Sanitation decision.

There are serious legal problems, therefore, under the mayor's Executive Order No. 49, in serving the professional engineers employed by New York City. There is the question of the appropriate unit, the separation of the professional from the nonprofessional in any election for a bargaining representative and the definite separation of supervisors from a unit and union containing nonprofessionals and nonsupervisors.

Grassroots Organizations

The professional society can act for the professionals in a manner other than as a labor organization which follows a collective bargaining procedure. The professional society members are composed of employers and employees banded together for their mutual benefit. They are "grassroots" organizations formed for their intellectual and economic advancement. The employer members do not outnumber the employee members, yet they can sit down together and work out their professional and economic advancement. They are men and women who can think for themselves, as the TV cigarette commercial would say it.

The Wagner Act of 1935 and the Taft-Hartley Act of 1947 made it the policy of the United States to foster and promote the concept of collective bargaining to resolve differences between management and labor. The law says that "management" may not interfere with the employee segment in the exercise of their rights under the law. The Wagner Act and the Taft-Hartley Act were thinking of the rank and file employee being protected from the activities of management which might interfere with collective bargaining rights. Professionals do not need this protection. They can think for themselves!

Remember, they have collegiate training and their work is intellectual, varied, nonstandard and requires discretion and judgment. They are intelligent enough to elect between collective bargaining and some other channel of communication with management. But that again leads to another problem. Management is usually afraid to discuss terms and conditions of employment directly with employees because they may be subject to the charge of unfair labor practice. When the professional elects not to be represented by a union, how can he discuss his problems with his employer? The NSPE has attempted to have the Taft-Hartley law amended to include a "Freedom of Association" clause for professional people. This would permit a professional organization to discuss with management all of the employee problems and yet not be classified as a "labor organization." The amendment has not yet been made to the Act. Until it is amended, there may be a method under which the professional society can represent its members.

The *Cabot Carbon* case, decided on June 8, 1959, by the Supreme Court of the United States, deals with the problem of employee-management committees. The decision of the U. S. Court of Appeals, Fifth Circuit, which was the lower court, decided that:

"The (Taft-Hartley) Act permits, and Congress intended that it should permit, the existence of employee-management committees which provide a forum for discussion of matters of mutual interest, but which are not formal organizations, do not follow collective bargaining procedures (formally or informally), have no powers to bargain collectively, and take no action inconsistent with the terms of an existing collective bargaining agreement."

In other words, the lower court said that when an organization "deals with employers" it is a labor organization, but when it merely "discusses with employers" and follows no collective bargaining procedure it is not a labor organization. The Supreme Court, however, reversed the Appeals Court on the question of whether the amendment of T-#89 (a) eliminated employee committees from the term "labor organization." They say that the law precludes the employer from dominating, interfering with or supporting such organizations.

In view of the legal implications of the *Cabot Carbon* decision, the New York State Society of Professional Engineers, in setting up its Functional Section for Engineers in New York City Public Service, provided in the Section's charter:

1. That the Section would discuss the problems of its members with management and legislative bodies and committees on a high professional plane;
2. That its Executive Committee, which conducts the activities of the Section, would have as members at least two city employees of a supervising rank; which would be a minority.
3. That no procedure of collective bargaining with management could be undertaken by the Section.

It is possible that the United States Supreme Court decision in the *Cabot Carbon* case would make the Functional Section and other "sounding board" organizations "labor organizations." The legal implication of the decision should be removed by the adoption of the "Freedom of Association" amendment to the Taft-Hartley Act as sponsored by the NSPE. In the meantime, we should be able to operate our functional sections as planned until they are decided to be "labor organizations" by proper authority.

In conclusion, there are many legal problems in serving the needs of engineers in public service. They cannot be solved overnight. Since politics is involved, it may take years of public education and even court action to reach the stage where professionals will be recognized as people who can think for themselves and act for themselves through their own professional organization and not through "labor organizations" commonly called "unions."—End.

Ethical and Professional Problems Created By the Mayor's Executive Order No. 49

By

JOHN T. DOLLARD

Senior Assessor, Public Utility Bureau, NYC Tax Department

ON MARCH 31, 1958, the mayor of New York City issued Executive Order #49 relating to the Conduct of Labor Relations between the City of New York and its employees. This action of the mayor's has evoked much favorable comment. It has as its declared objective, "to promote for city employees, as far as possible, the same procedures of collective bargaining presently prevailing in private labor relations." Executive Order #49 is now commonly known as the "Little Wagner Act" because it is modeled after the National Wagner Act. The late Senator Wagner's son now proposes to give to public employees such labor rights as were established by his father for private labor relations. It is commonly known that public employees are specifically excluded from the jurisdiction of the National Labor Relations Act.

The city commissioner of labor in . . . his report states that this "experiment in labor relations in municipal service is far from finished" and further states that it is "therefore deemed most salutary to operate by Executive Order for such period as reasonably necessary for fruitful experimentation with the crucial principles herein outlined."

My discussion is confined solely to the ethical aspects relative to these crucial principles, particularly as they relate to professional engineers.

The first question we raise is: Do the same ethical principles apply alike to both labor and professionals? Is there a distinction between a labor concept and a professional concept in employment relations?

Collective Bargaining

The mayor's Executive Order and accompanying regulations repeatedly refer to such terms as "Labor Organizations" and "Collective Bargaining." Can it be that the mayor deliberately intends that professionals *must* be represented by labor unions? I feel that it is more likely that the mayor, in his zeal to provide facilities for the 90,000 employees in the labor category, has entirely overlooked the one thousand or more professionals also under his jurisdiction.

We have already called the mayor's attention to our contention that *unionism and professionalism are incompatible.* Why do we contend that the mayor must recognize the basic distinctions between the labor organization approach to employment relations and the professional approach. I feel that our answer is found if we understand the terminologies used.

First: What is the usual concept of a labor organization and what is a collective bargain? These terms

are repeatedly used in the mayor's Executive Order #49. The N.L.R.B. Act in brief defines a labor organization as: "Any agency which exists for the purpose of *dealing* with employers concerning labor disputes or conditions of work." Please note the most important word "dealing."

In the *Cabot Carbon* case (U.S. Court of Appeals—5th Circuit), the Court gives a definition of the word "dealing." The court states that the "act of dealing" is the act of buying and selling. It is a reciprocal arrangement. The court requires that there must be two parties to a bargain, and that each party must contribute something to make a deal or a bargain.

In a collective bargain, what does the employer contribute? He contributes a raise or a fringe benefit. What does a labor union contribute in a collective bargain? It contributes a guarantee that every member of the organization will perform according to the bargain. Each and every member of the union surrenders his freedom as an individual and submits his actions to a group contract from now on and until the expiration of the collective bargain.

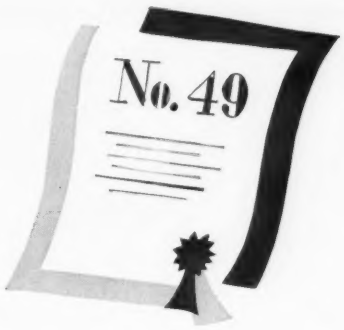
The union member is no longer a free agent. He gives up his freedom to think and act as an individual in exchange for a collective bargain. He is now regimented.

During the period of the collective bargain, the union member does no thinking for himself concerning his labor relations. The labor leader does his thinking for him and tells him what to do. And he had better do it. Union history is replete with examples of what happens to those who don't stay in line and who don't obey orders. *No professional wants a collective bargain tied around his neck!*

This term, "collective bargain," is appealing. It sounds strong and militant. What it really is, is a snare and a noose. Once you surrender your rights to act on your own initiative, you surrender the *basic characteristic* of a professional. When you surrender the right to act on your own thinking as an individual, *you are no longer a professional.* That's why our Society can never sign a collective bargain. That's why we say a professional must be treated separately and apart from labor organizations.

Pressure Tactics

What is the second basic distinction between the professional approach and the labor approach? This is a point relating to *tactics.* Labor unions espouse some very



repulsive types of pressure tactics. This pressure traditionally takes the form of sit-down strikes, slow-ups, picket parades exhibiting placards denouncing the employer, and so on. These demonstrations are normal union procedures. They have general acceptance today as approved union tactics. We frankly concede that if you are of the school which believes in these tactics, then you should immediately join up with the union. We say: Join up and get into the snake dance around City Hall. People who feel this way are happiest there and at least will have an outlet for their emotions. On last April Fool's Day, the New York *Daily News* was replete with pictures of union pickets parading around City Hall. However, we feel that an atmosphere of parades with dead fish dangling on a fish pole, or pickets wearing necklaces of Bermuda onions, is not an appropriate atmosphere for professionals. Even the members of the CIO Technical Guild were embarrassed by these pictures in the *Daily News.* It was most repugnant to them.

Common Denominator

My last point is that unionism, at best, *is rule by the lowest common denominator.* Under unionism you dare not perform better than your colleague. You must hold yourself in restraint so as not to do more work than your colleague. Can you imagine a doctor coming to cure your child of an illness and not offering to perform to the best of ability? No professional wants to perform in any manner except according to the best of his ability.

However, in unionism you must accept featherbedding. The featherbedding is written right into the collective bargain. Look only to the musicians' union, the printers' union, the locomotive engineers' union—just to mention a few. And don't think featherbedding will not be written into a collective bargain for engineers. Just two weeks ago, the AFL-CIO Board of Strategy met in Washington to make plans for enrolling white collar employees, particularly the 7,200,000 presently in professional, technical and kindred employment. If the CIO has its way, it will not be many years before a collective bargain will require every plan to be stamped: "This plan prepared in an approved union shop." That seal could become more important than the P.E. seal.

To sum up, there are three professional concepts which are at distinct variance with union concepts:

1. **A professional cannot submerge his individuality in a collective bargain.**
2. **Picket parades are a repulsive tactic to professionals.**
3. **A professional must not submit to rule by the lowest common denominator.**

Now, many remark—"Espousing these three ideals is very fine, but it is a negative approach. These three concepts are purely bromides. What is the professional society going to do for me?"

Our answer is: The first thing the Society is going to do for you is to offer you an opportunity to stop sitting on your hands; an opportunity to get up and do something for yourself! Become a member of a functional section and offer your services on a committee to develop the program *you* want. The program will be an expression of the will of the society members—not the will of a union hierarchy.

The New York State SPE is ready and willing to take a militant stand

in promoting the interests of its members. *And remember that you don't need a collective bargain around your neck to be militant.* We have been authorized to retain legal counsel to militantly present our objectives to the mayor, the budget director, the director of personnel, and to the board of estimate. All we need is your support as members of a professional society.—End.

Problems in Classifying Engineering Positions

By

SEMOUR BERLIN

Assistant Bureau Chief of Inspection and Classification, Civil Service Commission

Most of the 50,000 professional engineering positions in the Federal Government are subject to the Classification Act. As a result, the class and grade, and hence pay, of these positions is determined on the same basis as in the grade for each of the approximately 1,000,000 positions subject to the Act and engaged in performing a wide variety of clerical, administrative, technical, scientific, engineering, and other work.

The Act requires that all positions, regardless of function and kind, are to be placed in the same grade when the level of difficulty, the level of responsibility and the level of the qualifications required to perform the work of the position are essentially the same. Thus the law establishes the principle of equal *grade* for substantially equal work. The law also requires the Commission to promulgate the necessary standards for placing the positions in their proper grades. The law gives authority to the departments and agencies to classify their positions in grades GS-1 to GS-15 in accordance with published Commission standards and consistent with published standards when specific standards are not available for a particular class of position.

Our (engineering) classification standards are developed by a Commission standards writer who is trained in occupational analysis methods both for classifying jobs and evaluating experience and education required to perform the work. He gathers factual data about the jobs to be covered by the standards and the qualifications needed to perform these jobs, by interviews with engineers on the job, their supervisors, and key personnel and management officials in a selected sample of Federal agencies. During this process, there is usually considerable consultation with appropriate professional groups, both inside and outside of Government. Tentative drafts of standards for engineering jobs prepared by the Commission's Standards Division headed by Dr. C. Mansel Keene, are circulated for discussions and comment by personnel and management officials employing professional engineers and by professional engineering societies. The final standard is published only after the Commission has given careful consideration to all comments received from the best available experts—the personnel experts, those managing engineering operations, engineering societies, and individual engineers of established reputation.

The Commission is continuously reviewing its standards and striving to improve them. I think you'll be interested in one of our current experimental attempts to find new and better ways to reflect the values of jobs in Commission standards. We're working on a new kind of standard for research scientist positions. The standard now is in draft form, being circulated for comment and being tried out in several Federal research centers. The standard isolates and describes three levels of performance in each of several basic elements which, taken together, characterize all research jobs, regardless of the scientific discipline involved. We hope that individual positions can be evaluated by this standard in a manner which gives fuller recognition to the impact that a research scientist has on his own job.

One part of this same experiment is designed to determine whether uniform and reliable results can be obtained in using the standard when the standard is applied by a panel of senior scientists to scientific jobs in their own Federal laboratory. While it is still too early to assess the results of this experiment, the scientists who helped us develop this approach and draft the standard are enthusiastic about it. If it works well, a similar approach appears to be quite feasible for engineering jobs, particularly those engaged in research and development.

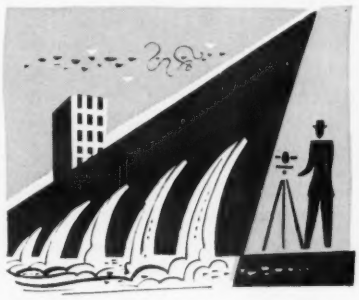
Problems in Classifying Engineering Positions

In many dynamic organizations we have seen how the experience, capability, personality or personal professional stature of the individual in a position have caused additional duties and responsibilities to gravitate toward the position. It is an old saying "If you have a tough job that needs to be done in a hurry, give it to a busy man." In the professional engineering field where additional manpower is always hard to get, this is particularly true. Because of the man in the job, the scope, the variety of assigned duties, the depth or breadth of specialization may all be substantially increased. So too, the responsibilities or authority vested in the position. The qualifications actually required to do the work change as do the nature of the supervisory relationships and the controls over the positions. Gradually a new position has evolved which may require an increase in the grade of the position. When this happens, our standards will permit an upgrading.

However, this picture is not always this rosy. Position in grades GS-15 and above cannot be readily upgraded because of the legal limitations on the number of positions in grades GS-16 and above. This sometimes causes a compression which makes it difficult or impossible to reflect accurately, in terms of grade, differences in the levels of the senior engineering positions. Inability to correctly place the chief in a GS-16, 17, or 18 position may serve to depress the grades of the other top positions. Sometimes a position may be of such nature that regardless of the incumbent, there are limiting factors which prevent its development sufficiently to justify a higher grade classification, even though there has been some increase in the level of duties and responsibilities. And unfortunately we find, from time to time, a case where the incumbent fails to develop a position to its full potential and equitable and fair application of the standard requires a downgrading.

Changing occupational techniques, approaches, and increases in the basic body of scientific knowledges also have a profound effect on positions. Introduction of electronic computors as basic research and development tools; the effect of the increasing body of basic theory on applied or product research; the availability of new energy sources and materials, and the new research applications and technological changes have had considerable effect both on the position and the man engaged in everyday professional engineering activity. Not only do positions require greater professional skills and knowledges and greater responsibilities for individual work; but we began to create men of widening reputation and increasing professional recognition. Both agency action in recognizing such changes in classifying positions and Commission production of new standards lagged in the past. A determined effort has been made in the recent past to meet both these problems to the maximum extent possible.

A contributing problem was the great amount of paperwork involved in the entire classification process. Many engineers, and others too, felt that they were always rewriting position descriptions and never being able to achieve clear understanding of their particular positions by the people responsible for classifying them. The Commission has redefined its requirements for position documentation, seeking to achieve concise, clear,



useful description, not more than two pages in length, which will meet classification requirements. We published new regulations on this, held special training courses for both agency people and Commission inspectors, and are publishing a new document "Less Paperwork in Position Classification" which will soon be available to all agencies. We hope this will free the professional engineer from as much tedious paperwork as possible.

Another contributing problem has been the inefficient utilization of engineers by management. Too often we find a professional performing nonprofessional work on a full time basis or for a substantial part of his work. In many cases this may effect the classification of the position. At the very least this represents available professional skills which are in short supply, but are not being used. The Commission has cautioned management on this and encourages periodic review by management of professional engineering positions to assure that maximum effective use is made of available professional talent.

Two Separate Plans

We've recognized the scarce labor market situation for professional engineers and have moved toward making pay more competitive to the extent current legislation allows. We must remember that the Classification Act is composed of two separate and distinct plans—a classification plan which sets the grade for a position and the pay plan which sets the rate of pay for the grade. The Commission by the Act can determine and charge the grade of a position subject to the limitations contained in the Act. The rate of pay for each grade can be changed only by legislative action and approval of the President.

We are recruiting the more promising college graduates in engineering at GS-7 rather than GS-5. This recognizes the higher potential these men and women bring to the job as well as helps make the pay rate for the top of the class more competitive with that in private industry.

The Commission has utilized its authority to increase the entrance rate of pay in a grade to the upper steps of the grade for certain positions in those geographic areas where such positions are in short supply. Such increases have been granted for practically all professional engineering positions in grades GS-5 to GS-14. This is a stop-gap measure, a device for making entrance pay rates in shortage occupations more competitive with those in private industry. It serves to cure some situations temporarily, but does not meet realistically the dynamic changes in labor market conditions. This practice also gives rise to a number of employee problems. There is a compression in pay rates to the disadvantage of the experienced engineer. The difference in actual pay between an engineer newly promoted to a GS-13 position considered the full-professional level, and one who has held a GS-13 rate for five or more years is not sufficient to reflect the added experience, knowledge, professional recognition and worth of the man to the organization. Similar problems exist at the next higher levels and when coupled with decreasing opportunities for grade promotion, employee dissatisfaction must naturally increase.

In 1949, the Classification Act established a ceiling of 400 posi-

tions in grades GS-16, 17, and 18. Today we have approximately 1,500 such positions. The increase in the number of these top graded jobs, which the Commission feels still is inadequate to meet the compression in the top grades, is a move in the right direction and has permitted the ungrading of some of our top engineers.

In 1947, the Congress enacted Public Law 313 permitting the addition to the professional and scientific service of not more than thirty positions in the War Department and not more than fifteen positions in the Naval Establishment and provided:

- **Each such position be established to carry on research and development functions relating to national defense, military and naval medicine, and any other activities of the War Department or Naval Establishment requiring the services of specially qualified scientific or professional personnel.**
- **Pay shall not be less than $10,000 per annum nor more than $15,000 per annum. At this time $10,000 was the highest rate of pay under the Classification Act.**

Today the Department of Defense, the successor to the War and Navy Departments, has authorized 292 such positions. Current legislation has been introduced to raise the number of such positions to 450. Various other agencies, including the Departments of Interior, Commerce, Agriculture, Health, Education and Welfare, have been granted such positions under similar type legislation. Today's salary scale ranges from $12,500 to $19,000. The highest rate under the Classification Act, GS-18, is $17,500.

The increase in the number of Public Law 313 type positions has helped to reduce some of the compression at the top and has given recognition to our most prominent engineers engaged in research and development.

HR 2830 was introduced in the 85th Congress to establish a scientific and professional service. This bill, and a number of similar bills introduced at various times by Messrs. Gubser (HR 2803 and 5198), Moss (HR 2804 and 2200), Foley (HR 6421) and others, seeks to recognize certain scientific and professional occupations and provides a special pay plan for them at rates higher than the pay plan covering Classification Act positions.

It is interesting to note that one of the accomplishments of the Classification Act of 1949 was to abolish the five services, including a Professional and Scientific Service, established by the Classification Act of 1923; and to cover all Federal employees in a single general schedule. In recommending the combining of the five services into a single schedule, the following situations were noted:

1. **The use of five services tends to make for pay inequities.**
2. **It tends to make the task of classifying positions more difficult.**
3. **It tends to divide government employees into castes—makes for jealousy, class consciousness, and invidious distinctions.**
4. **It leads to pressures from agencies and employees to place positions in the professional and scientific service.**
5. **No affirmative or positive value—the same advantages can be obtained through an administrative grouping of like positions.**

Most of these objections can be stated to the present legislation. In analyzing HR 2830, we also noted the following points which may be of interest to you.

1. **The bill does not include all professional engineering and scientific occupations which are in critically short supply—e.g., safety engineers, automotive engineers, ceramic engineers, architects, positions in veterinary service, etc.**
2. **The bill does include other professional positions *not* in critically short supply—e.g., geographers, psychologists, accountants, dental officers, trial attorneys, etc.**
3. **The bill covers at least one *nonprofessional* group, engineering aids, and fails to include at least another important support group in research and development work, the physical science aids.**

While this bill, if enacted, might give some temporary relief, it would still have the same inherent inflexibility—its rates could only be changed by direct legislative action.

And lastly, but not least, enactment of this bill would add another pay system to the some seventy-seven pay systems now used to pay all employees of the Federal Government.

Certainly both the Administration and the Congress are aware of and are working on this problem.

The administration believes that the solution lies in the adoption of a uniform and comprehensive pay system which will:

1. **Provide equitable pay treatment for all government employees.**
2. **Eliminate the rigidity characteristic of all the present statutory pay systems**
3. **Eliminate the caste system which is fostered by having so many systems; and**
4. **Eliminate the employee dissatisfactions caused by the many distinctions which often are inconsistent, governing the placing of a position under a particular system.**

At the request of the President, a bill has been introduced in Congress to establish a Commission to develop and recommend a general policy for the compensation of all our civilian personnel who work in more than 15,000 occupations.

Congressman Tom Murray, chairman, House Committee on Post Office and Civil Service, recently announced that his Committee will begin a study in August, 1959, of the Classification Act and the salaries and grades of classified employees. Some of the areas the study will cover include:

1. **Relationship of pay grades to one another.**
2. **Relationship of job standards to pay setting.**
3. **Engineering and scientific salaries.**
4. **The scope of automatic within grade pay raises.—End**

WATER— WILL THE LACK OF IT STOP OUR PROGRESS?

Keeping a check on the nation's water supplies is a never-ending job for the U.S. Geological Survey.

IF any of America's budding engineers are concerned about long-range job possibilities, they might take a look at the field of water resource development.

The U. S. Department of Commerce's Business and Defense Services Administration, an agency which, among other things, keeps a close check on the status of the country's utilities, has just released a 12-page report in which it estimates that the U. S. will have to come up with something like $171 billion to meet the nation's water development needs by 1975.

If America meets these requirements—and apparently it will have to if it intends to maintain industrial growth—water development may become one of the biggest challenges for the engineer during the next two decades.

The BDSA's report went by the popular press almost unnoticed, but its implications are quite plain to engineers who have long been concerned about the country's complacent approach to the challenges of developing a water supply that will keep with the demands of a growing economy.

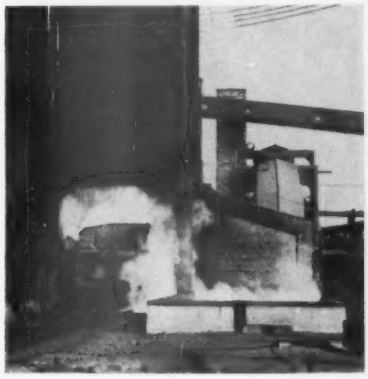
Based on 1958 replacement costs, the U. S. already has nearly $179 billion invested in water development, a figure roughly equivalent to the value of two-thirds of the stocks listed on the New York Stock Exchange. That may seem like a staggering figure, but if the BDSA estimates are correct, the country must almost double that investment in the next seventeen years.

And as Walter L. Picton, director of the Water and Sewerage Industry and Utilities Division of BDSA, points out the cost projections are based on somewhat conservative estimates of population growth and industrial expansion.

Engineers at the U. S. Geological Survey warned the country several years ago that it would need nearly 600 billion gallons a day to meet its domestic and industrial requirements by 1980. That compares with a present use figure estimated at 240 billion g.p.d. In 1900, the country got by nicely on only forty billion gallons a day.

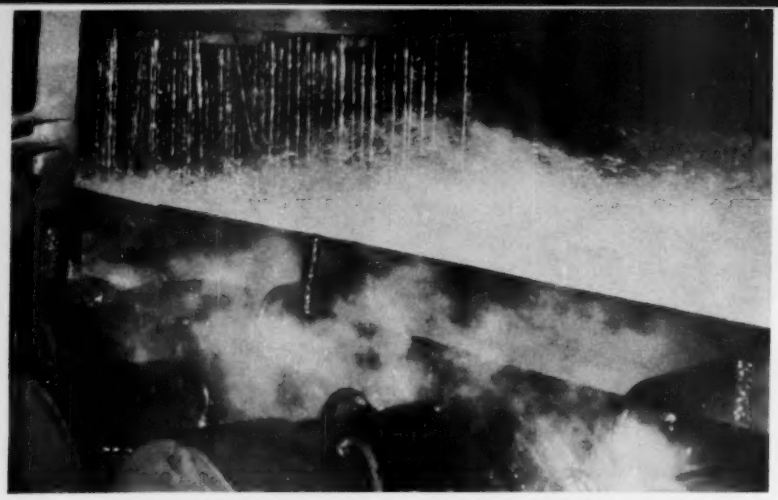
Does the U. S. have the water resources to meet these increased demands? The concensus of engineering opinion is that it does providing it is willing to spend the money to improve its development and conservation practices. In view of the predicted demands, the country is obviously far behind in both areas.

Last year the BDSA took a look at the state of the nation's waterworks and sewer facilities and came up with some strong evidence that

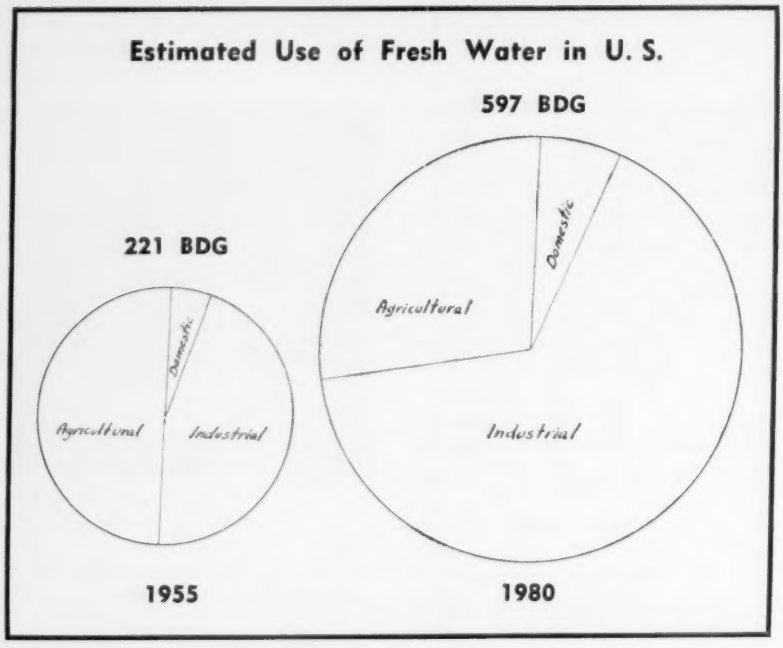


One of the prime uses of water at a steel plant is in the quenching of coke. Here twenty-five tons of water are being dumped on a car loaded with incandescent coke.

This 96-inch welded steel pipe carries part of the nearly 100 million gallons of treated effluent which Bethlehem Steel's new plant at Sparrows Point near Baltimore uses each day.



Water is used to eliminate scale as slabs move through a hot strip mill. Metal work is a prime user of industrial water.



the country was failing to meet present needs much less providing for the future growth. BDSA found the investment some $4.6 billion short of what was needed in the way of waterworks and another $6.9 billion short of requirements in the sewerage field.

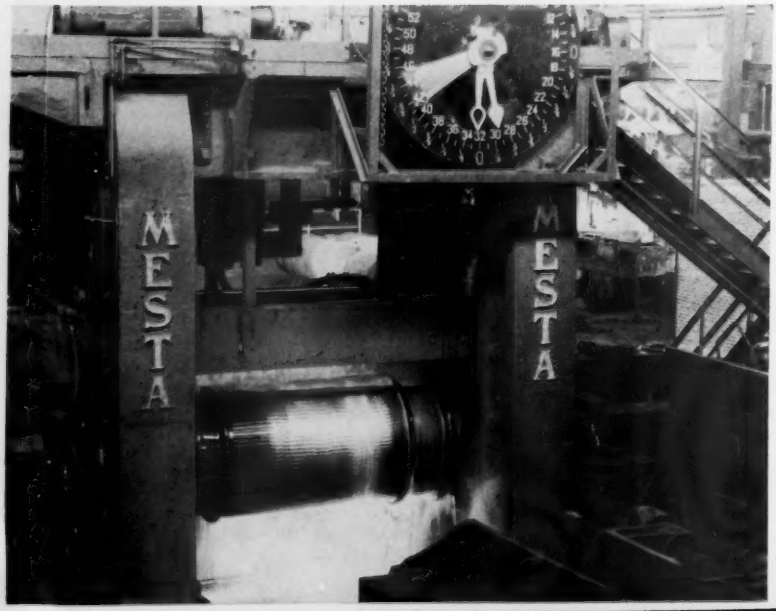
Surveying the situation, *Fortune* magazine called it the country's "worst public works problem."

MOST growing American communities are becoming painfully aware that lagging water development is a serious deterrent in efforts to attract industry. For industry today is becoming more and more conscious of the tightening water supply and of the costs involved in developing a source capable of keeping water-thirsty manufacturing processes going.

In fact, many engineers and industrial leaders believe that water may emerge in the next twenty years as the prime factor which an industry must consider in choosing a site for new or expanding operations.

As an executive of General Motors Corporation told a Midwest water conference last summer: "We can establish markets and get transportation to these markets. But if the plant runs out of water it is dead overnight."

Much of the country's increased demands for water can be laid on industry's doorsteps. Industrial consumption of water has quadrupled since the turn of the century



High pressure water jets spray water on the rolls of a 54-inch blooming mill at the Bethlehem Steel plant at Sparrows Point, Maryland. The water is used to cool the ingots and remove scale.

1980 industrial water needs by region (all quantities by million gallons a day)*:

New England	11,000	Missouri-Hudson Bay	13,200
Delaware-Hudson	19,100	Lower Mississippi	17,700
Chesapeake	9,900	Arkansas	8,000
Eastern Great Lakes	34,800	Western Gulf-Rio Grande	14,600
Western Great Lakes	55,000	Colorado River	1,200
Upper Mississippi	33,400	Great Basin	1,100
Southeast	60,000	Pacific Northwest	8,700
Tennessee-Cumberland	18,700	South Pacific	4,000
Ohio River	83,800		

*Based on a report by D. R. Woodward, U.S. Geological Survey engineer.

but that increase may look small beside the demands of 1980.

D. R. Woodward, an engineer for the U. S. Geological Survey, predicts that industrial fresh water demand in 1980 will be about 400 per cent over the requirements of 1955. That would represent a gross requirement of something like 390,000 million gallons a day.

A glance at some of the water consuming manufacturing processes can easily explain why industry consumes such gigantic chunks of the nation's water supply. A ton of cold rolled steel will eat up nearly 65,000 gallons; a ton of high grade paper 75,000 gallons; a ton of explosives 200,000 gallons, and a ton of synthetic rubber almost 660,000 gallons.

Until fairly recently many industries, like municipalities, took a rather casual attitude toward water. In the early days of industrial development there was a plentiful supply of water and it was usually the cheapest item in the manufacturing process. As a result few industries put much effort into developing supplies or in setting up economical utilization methods.

Today, that head-in-the-sand attitude is changing rapidly as industrialists face up to the realities of the water supply problem. Engineers are being called in more frequently to help develop industrial water supplies and, more important, to assist in developing economical uses of present supplies and prevent ruination of other sources by pollution. With this engineering help, companies are finding that they often can get by on a lot less water, water of lesser quality (saline water in some cases) and at the same time cut costs.

Speaking before an industrial water conference at the University of Michigan in June, Robert M. Critchfield, vice president of General Motors, called on engineers "to accept the challenge of making less water do more work in the manufacturing processes."

"This is a challenge, an opportunity, a problem in process development," he said. "How can we so engineer our processing that we can get the same results with less water?"

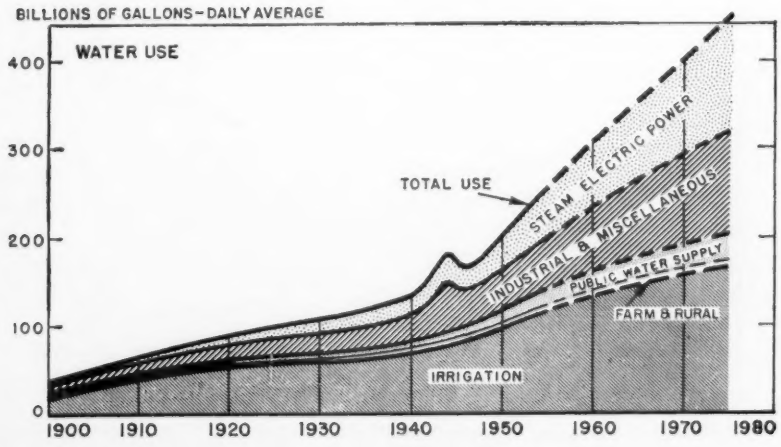
E. J. Wengernuk, U.S. Geological Survey scientific aid, makes a test of water in the Delaware River near Delair, N.J. The USGS is the prime source of information on the nation's water supply.

In many areas, engineers have already picked up the challenge.

Even sewage and polluted waters, until recently almost a total loss, are being converted to use in some industrial processes. A West Coast refinery recently announced it was using nearly two million gallons a day of waste water from a municipal sewage plan. In Ohio, a steel mill is conserving its water by re-using drainage from drinking fountains and filter wash water.

RECIRCULATION is probably the most widely used method of water conservation in industry. The National Association of Manufacturers in its report on "Water in Industry" found that about forty per cent of the plants surveyed

Estimated Total Water Use in the U. S.



made some re-use of their water. Most of them, the NAM said, apparently re-use less than fifty per cent of their water, but 121 industries listed re-use in excess of 200 per cent.

One of the classic examples of water conservation through re-use is at the Fontana plant of the Kaiser Steel Company in California. There the water intake per ton of steel has been cut to 1,100 gallons compared to the industry wide average of nearly 65,000 gallons. In Texas a steam electric power plant was able to reduce its water use to one gallon per kilowatt hour output by recirculating its cooling water. Steam power plants, where the water is not circulated, require between 60 and 100 gallons per kilowatt hour.

Re-use and other conservation measures, of course, can never solve the industrial water problem by themselves. The water must be developed in the first place.

With the water supply becoming tighter and with municipalities either unable or unwilling to provide the water, many industries are developing their own sources.

The BDSA estimates that the investment in self-owned industrial water supply and treatment has increased from less than $5 billion in 1900 to nearly $38 billion in 1958. By 1975, this should be increased, BDSA says, to an investment of $71 billion.

These figures indicate plainly that water is becoming an increasingly more costly item for industry. And as more of the readily available sources are depleted, the job of developing new sources is going to take more of the industrial dollar.

C. G. Paulsen, chief hydraulic engineer of the Geological Survey, has suggested a possible four-prong attack on the water problem. They include (1) the development of new sources of supply such as the demineralizing of saline waters and inducing of artificial precipitation; (2) further development of present supplies by storage, control of pollution, etc.; (3) reduction of water losses, and (4) more efficient use and re-use of existing supplies.

With the water situation becoming complex, the responsibility of developing the water necessary to keep industry going is falling more and more to the engineer. And its a vital responsibility, for industry can no more expect to operate without adequate water than it can without manpower or raw materials.

Water is a major resource problem today and apparently will become more of one in the next quarter of a century. Many experts believe we have only begun to tap the possibilities for increasing the total water supply of the nation.

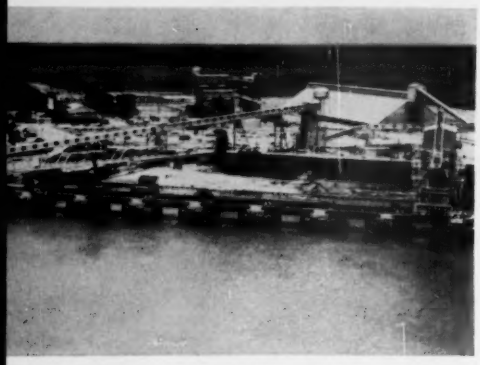
If the most conservative estimates of industrial and population growth are accepted, the necessity of developing these resources becomes obvious.

Fortunately public opinion is slowly adding its weight to efforts to develop long-range supplies. Utilization methods are showing marked improvements just as the uses of other resources like timber and land were improved earlier in the century.

Considering our present stage of development and our anticipations for future growth, it appears likely that water development will be a major engineering task for years to come.—End.

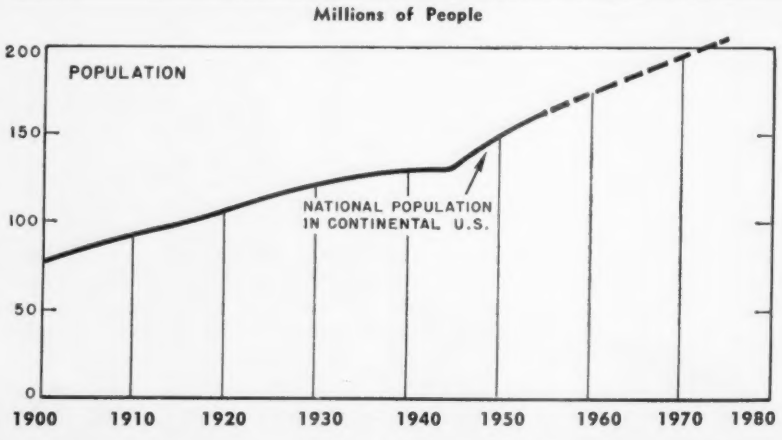
The NAM found this percentage of water re-use by various industries:

	Per cent		Per cent
Apparel and textiles	14	Nonferrous metals	18
Autos and aircraft	25	Optical and medical	21
Chemicals and drugs	35	Paper and pulp	52
Foods, beverages	22	Petroleum	98
Iron and steel	25	Plastics	19
Leather	12	Stone and glass	25
Lumber and furniture	23	Toys and sports goods	19
Machinery and tools	15	Miscellaneous	22



Aluminum plants, one of the big users of industrial water, usually are located near plentiful water supplies. Here is a $55 million plant completed last year by the Ormet Corporation on the Mississippi River near Burnside, La.

U. S. Population Growth, 1900-1980



Carpenter Slayton Schirra Shepard Grissom Glenn Cooper

First U.S. Space Traveler Likely To Be an Engineer

Q. What will the first U.S. space satellite crew members have in common?

A. An engineering degree or its equivalent in training and experience.

OF THE seven astronauts selected for Project Mercury—the U.S. man-in-space program—four are graduate engineers and the other three have completed extensive engineering studies at military schools and civilian colleges. All seven are also military test pilots. But pioneering in the age of space is turning out to be largely an engineering show from R&D through rocket launching, tracking, telemetry, and handling the controls of a capsule orbiting about the Planet Earth at nearly 18,000 miles per hour.

"The program is heavy on the engineering side," Capt. Donald K. Slayton, USAF, one of the seven astronauts, told an AMERICAN ENGINEER staff reporter at Langley Research Center. "In fact," the aeronautical engineering graduate pointed out, "we are spending quite a lot of time with NASA engineers on all phases of the project."

To get Capt. Slayton and his six astronaut colleagues into orbit, the National Aeronautics and Space Administration has set up a special space task group for Project Mercury at Langley Research Center in Hampton, Va. The task group will spend $70 million out of the 1960 NASA appropriation of some $300 million. The objectives of Propect Mercury can be summed up in three brief sentences:

- To put a manned space capsule into orbital flight around the earth.
- To recover successfully the capsule and its occupant.
- To investigate the capabilities of man in this new environment.

No human has yet ridden up in the nose of an intercontinental ballistic missile. No human has ever been in an orbiting space satellite. No human has ever been in a state of zero gravity for more than about fifteen seconds. And no human has parachuted down in a capsule from an altitude of 150 miles. The scope and complexity of Project Mercury can be seen in the fact that it is attempting to remove the negatives from each of these statements.

The Mercury astronauts will soar into space in a bell-shaped capsule in the nose of the Atlas missile. The capsule, now in production by McDonnell Aircraft in St. Louis, is essentially a double-walled pressure vessel made of titanium. A heat shield of cobalt alloys encloses the lower or forward end of the capsule. The heat shield is designed to withstand temperatures up to 12,000° F., which are expected to be encountered on the forward end of the capsule as it re-enters the atmosphere. The astronaut lies on his back on a form-fitted couch during the launching. The Atlas, launched at Cape Canaveral, will boost the capsule to a nearly circular orbit at an altitude of between 150 and 200 miles, permitting a 24-hour satellite lifetime. When the capsule has made the prescribed number of orbits about the earth, retro-thrust rockets will be fired. This will slow the capsule below the velocity needed to maintain a satellite orbit, and it will spiral toward the earth. A drogue parachute at about 60,000 feet and a landing parachute at 10,000 feet will slow the capsule's descent, and the astronaut will land in the capsule. A global tracking network will follow the capsule and direct recovery crews to the landing site.

"We know we are not going to get 100 per cent reliability in the rocket boosters that will be available," the chief of Project Mercury stated at a "progress report" press conference at Langley Research Center. Since five out of the last six Atlas missile launchings were described as failures, the question of reliability does become pertinent. NASA engineers have developed an escape system consisting of a rocket extended on a tower-like structure atop the space capsule. In the event of a booster malfunction, or impending malfunction, various instruments will trigger an abort system which will fire the escape rocket and send the capsule

some 2,000 feet up and away from the Atlas booster.

THE seven astronauts themselves are an integral part of the engineering team effort which is going into the design of equipment and the establishment of operational procedures. Each astronaut has been given specialty area assignments in the program. These assignments are: Lt. Carpenter, navigation and navigational aids; Capt. Cooper, the Redstone booster; Lt. Col. Glenn, crew space layout; Capt. Grissom, automatic and manual attitude control system; Lt. Commander Schirra, space capsule life support system; Lt. Commander Shepard, range, tracking, and recovery operations, and Capt. Slayton, the Atlas booster.

Wind tunnel tests at supersonic velocities have played a major role in the design and planning for the Mercury space capsule and its rocket-fired escape system. Free-fall tests from aircraft have also been made with capsule models. Before the first astronaut is sent into orbit, the escape system will be tested with animals aboard the capsule.

The astronauts were chosen for these assignments on the basis of educational background and experience in related fields. Each is being briefed by engineering panels concerning their assigned areas. The astronauts will thus have a voice in the design and development of equipment and operation procedures, although the NASA space task group staff will have the final say in all decisions.

In navigation and navigational aids, Lt. Carpenter's specialty area assignment, the latter will have the opportunity to contribute to basic space navigation. "The idea is to work out systems which can be applied to future satellite and space vehicles," Lt. Carpenter emphasized. Many navigational problems need to be solved before the crews of manned satellites can be sure of their position and course in high-velocity planetary orbits. In his assignment of the Army's Redstone missile, Capt. Cooper will study the components and launching characteristics of a rocket booster which will be used for the first manned capsule tests. The highly reliable Redstone will carry the manned capsule up to a satellite altitude, but will not place it in orbit. The Atlas booster itself will be the special study of Capt. Slayton. An aeronautical engineer, the astronaut will familiarize himself with the intricacies of the vehicle which will actually put the first American in a satellite orbit.

The crew space layout assignment of Lt. Col. Glenn is another area which has considerable importance for future space voyagers. The Mercury astronauts will be secured in their tiny space capsule with little room to spare. All instruments and communication controls must be literally at their fingertips. The crew space layout must be designed to give the astronaut complete access to all buttons, switches, and dials throughout the launching, orbiting, re-entry, and recovery phases of the Mercury operation.

Another aspect of the crew space layout problem is the automatic and manual control system which regulates the attitude of the capsule while orbiting and in free fall. This is Capt. Grissom's specialty area and he will be involved with the details of a system which will likely form the basis for controlling the first manned space satellite stations. The attitude of the Mercury capsule will be regulated by small rocket motors operated in response to an autopilot. The autopilot will be directed by a horizon scan system which is sensitive to infra-red rays and can sense the earth's horizon by the difference in heat between the edge of the earth and outer space. The capsule will also have a periscope and manual control system so that the pilot can stabilize the attitude of the capsule in space. "We can be passengers or pilots, depending on the mission," Capt. Grissom explained.

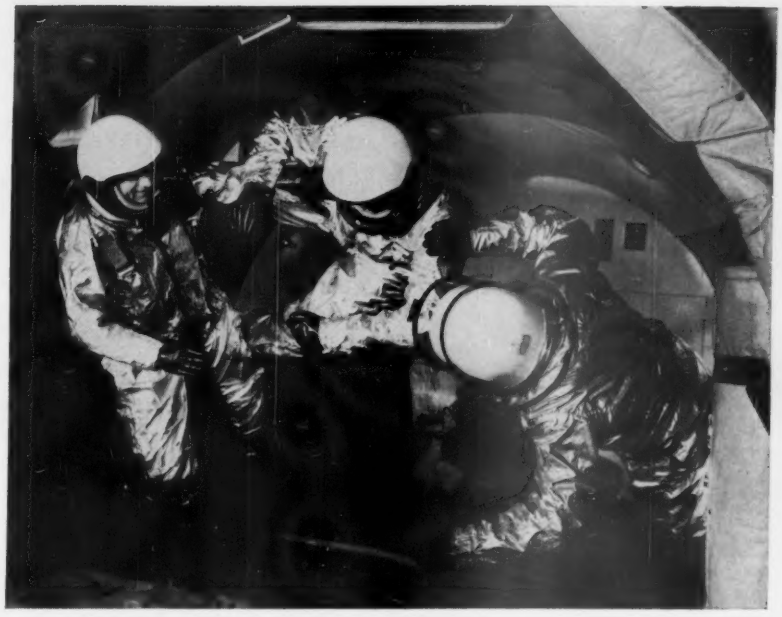
In the life support system area, Lt. Commander Schirra will assist in working out the details of supplying the astronauts with enough food, water, pressure, and oxygen. The capsule must also contain equipment for removing noxious gasses and for temperature control. No Project Mercury missions will exceed twenty-four hours in duration, but the life support system will be designed to support the astronauts for a maximum of forty-eight hours.

THE specialty area assignment of Lt. Commander Shepard — range, tracking, and recovery operations — can be described as world-wide. The total cost of the Mercury tracking and ground instrumentation is expected to take a $25 million slice out of NASA's appropriation pie. Western Electric has been selected by NASA as the prime contractor for the tracking and telemetry network which will include

installations in Africa, the South Pacific, Central America, Florida, Hawaii, Southern California, and on two islands in the Atlantic and two in the Pacific, and on two ships. This network must be capable of monitoring the on-board equipment of the capsule, including the life support system, the physiological reactions of the astronaut, and the re-entry command equipment. It must also be capable of maintaining communications with the astronaut during the flight. "The tracking and communications network for this project," Lt. Commander Shepard explained, "is one of the biggest differences between Mercury and the unmanned satellite operations." Four companies will be associated with Western Electric as major subcontractors for the tracking network: Bell Telephone Laboratories, Whippany, N. J., system engineering, engineering consultations, and command and control displays; International Business Machines, New York, computer programming, simulation displays, and computers; Bendix Aviation Corp., Towson, Md., installation of radar, ground to air communications, telemetry and site display equipment, and Burns and Roe, Inc., Hempstead, L. I., site preparation, site facilities, construction, and logistic support. Western Electric, as the prime contractor will be responsible, in addition to contract management, for over-all logistics and training, and ground communications.

While the seven astronauts are participating in the development of Mercury equipment and operations, they are also undergoing an intensive educational program in the basic sciences having to do with outer space, and they are being given a training program based on expected space flight conditions. The educational phase includes instruction in astronautics, particularly ballistics, trajectories, fuels, guidance, and other aspects of missile operations, basic aviation biology, the space environment, astronomy, meteorology, astrophysics, and geography, along with the techniques for making scientific observations in these areas.

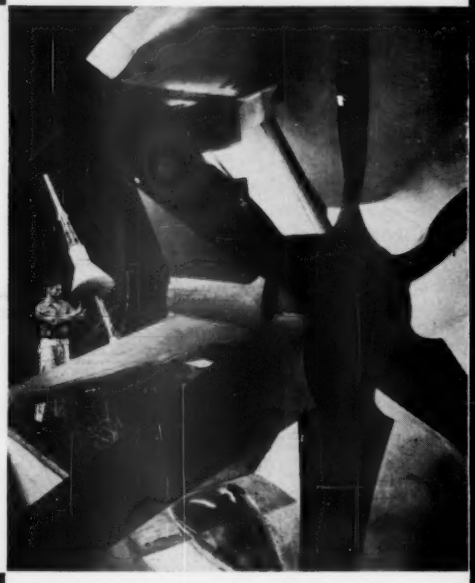
Another phase of the training is designed to familiarize the astronauts with the heat, pressure, G force levels, and other special conditions of space flight. This takes in periodic simulated flights in centrifuges and pressure chambers, weightless flying, training in human disorientation devices, techniques to minimize the effects of vertigo, and experiments with high heat environments. The whole problem of human behavior in a state of weightlessness has been a subject of large concern in the astronaut training program. Zero gravity states achieved in aircraft are limited to about fifteen seconds. In this time period the astronauts have floated free in the cabin of the aircraft with no apparent ill effects. "It's a pleasant feeling, on the whole," reports Lt. Col. Glenn of his experience in the weightless state. The astronaut added that "from what we have experienced of it so far, I don't think the zero gravity thing is going to be any serious handicap in carrying out the Mercury flights." Familiarization with the operation of ground support equipment and launch crew techniques will be accomplished in coordination with the agencies providing boosters and launch facilities. The astronauts are also scheduled to maintain their proficiency in high performance jet aircraft. However, military red tape resulted in a situation whereby the astronauts had nothing better to fly than a T-33 jet trainer up to August.



Floating in a weightless state of zero gravity for up to fifteen seconds while clad in full-pressure suits is part of the space training for the seven engineer-astronauts in Project Mercury. The astronauts described their experiences in the weightless state as "not at all unpleasant." Here, three of them are floating free in the cabin of a C-131 transport at the Wright Air Development Center, Dayton, Ohio.

THE busy role of the astronaut in the Mercury capsule was described for the press at Langley Research Center by C. W. Mathews, operations division chief for the NASA space task group: "We will want him to communicate with ground stations. He will be over stations for about a five-minute period, but there will be cases where he will not be able to talk to people for about ten minutes. We want him to make scientific observations. This will be the first chance a man has had to be in this position for any length of time, to observe the earth and the stars, and so on. We want him to be qualified so that he can come back with whatever information he can obtain from his observations. The astronaut will monitor equipment in the capsule. If the equipment is not operating properly, he will initiate emergency

Above: This one-sixth-scale model of a Project Mercury space capsule and escape system is tested at NASA's Langley Research Center to determine the effect of escape system power on the stability of the capsule.



Right: Giant fan blades in a NASA wind tunnel frame a one-fourth-scale model of a Project Mercury space capsule just before it is tested for stability characteristics. The pylon-like escape system is designed to pull the capsule away from the rocket booster in case of a malfunction.

Below: Speed of the air passing over the one-ninth-scale model of the Project Mercury space capsule in this schlieren, or flow visualization, photograph below was 3.94 times the velocity of sound as engineers put the model through flow field tests.

procedures. He will be able to navigate to the extent that he will be able to determine where he is at any particular time. He will be able to predict just where he is going to be so that he can determine where and when to fire the retro-rockets to bring him back in at the proper point. He will be able to deploy the landing parachutes if he decides that our automatic deployment system is not functioning properly."

The operations chief emphasized that "because of the requirement to contribute scientifically to the program, we required that the astronaut have a bachelor's degree in either science or engineering, so that he can understand the development that is taking place."

Present scheduling for the Mercury program indicates that the first astronaut will be aloft in the early part of 1961. In the meantime, instrumented, but unmanned, space capsules will be tested in sub-orbital and orbital flights. The Atlas booster will be made operational. Capsules containing animal passengers will be sent into orbit, tracked by ground stations, and recovered after re-entering the atmosphere and parachuting to landings on land and sea. The engineering efforts applied to these preliminary activities will provide the technological framework for the U. S. manned space vehicle program.

—End.

Report on a Case by the Board of Ethical Review

The Board of Ethical Review was established to provide service to the membership of the NSPE by rendering impartial opinions pertaining to the interpretation of adopted Canons of Ethics and Statements of Policy regarding professional conduct. The *American Engineer* will print findings on specific cases as they are reported by the BER to the NSPE Board of Directors.

Case Number: *58-1.*

Subject:

Section 27, Canons of Ethics: *"He will not use the advantages of a salaried position to compete unfairly with another engineer."*

Procurement of engineering contract as consultant while employed by public agency on related subject matter.

Facts:

An agency of a foreign government invited proposals from consulting engineering firms to complete the design and supervise the construction of a hydroelectric project which is being financed in part by a World Bank loan. The basic plans for the project were prepared by an agency of the Federal Government of the United States, and the project report was made by an agency of the foreign government, with the assistance of a team from the U. S. Agency.

Several engineers in the employ of the U. S. Agency responsible for the basic plans negotiated with at least two engineering firms with the intent of taking part in the design and supervision of the work. Negotiations were finally concluded between this group and a firm of consulting engineers for a cooperative project to execute the work, and the group of employees formed a corporation to be a part of a joint venture to design the hydroelectric project. At or about the time the negotiations with the foreign government were concluded, this group of engineers resigned their positions with the U. S. Agency and shortly thereafter entered into contract with the foreign government.

Question:

The Board of Ethical Review was asked to study this case and give their opinion regarding the ethical implications and specifically to answer the question—

"Was it a violation of the Canons of Ethics or the Rules of Professional Conduct for employees of the U. S. Government, while still employed, to organize a new private company and negotiate a contract to take part in the design of a project for which they had prepared preliminary plans as employees of the Government?"

Section 27 of the Canons is as follows:

"He will not use the advantages of a salaried position to compete unfairly with another engineer."

Rule 51. *"While in a salaried position, he will accept part-time engineering work only at a salary or fee not less than that recognized as standard in the area."*

Rule 52. *"An engineer will not use equipment, supplies, laboratory, or office facilities of his employer to carry on outside private practice without consent."*

Discussion:

The evidence in this case is of such a nature and the implications so far reaching, that a pinpoint decision is difficult if not impossible to achieve. It was not possible for the Board to meet and discuss the case and it could not bring in the witnesses for explanation or cross-examination.

There can be no question of the basic right of an American citizen to resign from one position and accept another or initiate a business of his own. NSPE has formally recognized that right in Professional Policy No. 52 which says:

"It is the stated policy of the Society that an individual professional engineer has the right to seek and accept other employment in his field, provided the seeking and acceptance of such other employment is consistent with the Canons of Ethics as it pertains to relations with clients and employers. NSPE looks with disfavor on any provisions in contracts, or conditions of employment, which unreasonably limit this right."

It seems axiomatic that the personal and intimate knowledge of the project which the employees gained from their work on the preliminary design of the project and the acquaintance they made with the representatives of the owner of the project gave them many distinct advantages over any other firms who may have considered the offering of their services to the owner. The crucial question is, therefore, "Were these advantages used unfairly?"

This could have been accomplished by withholding certain information from the competitors, by misrepresentation to the owner of the importance of their inside information, or by quoting a price which was lower than could be considered proper for the securing of data for and the design of the project. It has not been established that any of these things occurred. However, they might have been used and in any case the possibility of the existence of one or more of these facets raises a cloud of doubt as to the purity of the enterprise.

It becomes a matter which might be considered under Section 19 of the Canons, which states:

"The engineer will endeavor to protect the engineering profession collectively and individually from misrepresentation and misunderstanding."

Conclusion:

The Board believes that the men in question have violated the spirit of the Canons and Rules, although the evidence does not prove them to be in violation of specific paragraph, as now worded.

The Board believes that it makes little difference in the basic ethics

(Continued on page 58)

'Sounding Board' Organizations And Their Affiliation with NSPE

Mr. Hoft

By

RICHARD G. HOFT, P.E.*

Member, NSPE Engineers-in-Industry Subcommittee

MINNESOTA has recently made a significant step toward full professionalism for the engineer in industry. J. T. Ludwig described the affiliation of the Honeywell Engineers' Club with the Minnesota Society of Professional Engineers in the April issue of the AMERICAN ENGINEER. It was the first affiliation of an industrial sounding board type organization with an NSPE constituent society. This has been the result of recently-developed NSPE policy to encourage sounding board type organizations to become a part of the professional society and it is believed to provide a positive means for NSPE to serve engineers in industry in a tangible and professional manner at the local level.

Although the action in Minnesota is the breakthrough in affiliations of this nature, it is expected that a number of similar actions will follow in the near future.

The major purposes of this article are to discuss the reasons for the NSPE policy toward such affiliations, to explore the methods being used to accomplish these affiliations, and to discuss general patterns that may be apparent to enable others to most effectively accomplish affiliation.

Sounding Board Organizations

What is a sounding board organization? This is the first question that must be answered preparatory to a discussion of affiliation of sounding boards with NSPE. The *middle ground* is a very good summary description of sounding board organizations. They are nonbargaining groups of engineers including those in management, employed by one industrial concern. Key points are that both nonsupervisory and supervisory engineers are generally included in the membership of sounding boards and they are not certified collective bargaining units nor do they have any desire to become bargaining units.

In fact, generally their constitutions expressly prohibit them from bargaining and/or becoming certified bargaining units. Their purpose is to improve communications between professional engineering employees and management by serving as an objective fact-finding body, and their activities are carried out in complete accord with the professional concepts of NSPE. The basic philosophy of the sounding board organization is that in a truly representative body, the facts on matters affecting engineers can be readily brought into focus and when these facts are presented to enlightened managements, proper action will be taken without need for compulsion or legal force of any kind.

This may appear to be an idealistic approach to the engineer-management relationship, but it is an approach which has been working very effectively in a number of concerns for many years. The Schenectady General Electric Engineers' Association has been operating effectively as a "sounding board" for over twenty years.

Table I shows the "sounding boards" presently known to be active throughout the country:

TABLE I

- Conference of Professional Technical Personnel, Inc., Bell Telephone Laboratory, Summit, N. J. (Unlike other "sounding boards," engineers in management are excluded.)
- Society of Professional Chemists and Engineers, Humble Oil, Baytown, Tex.
- Consolidated Edison Forum, New York, N. Y.
- Honeywell Engineers' Club, Minneapolis, Minn.
- Bridgeport General Electric Engineers' Association, Bridgeport, Conn.
- Evendale Engineers' Association, General Electric, Evendale, Ohio
- Fort Wayne Association of General Electric Engineers, Fort Wayne, Ind.
- Pittsfield General Electric Engineers' Association, Pittsfield, Mass.
- Association of Roanoke General Electric Engineers, Roanoke, Va.
- Schenectady General Electric Engineers' Association, Schenectady, N. Y.
- Syracuse General Electric Engineers' Association, Syracuse, N. Y.
- Valley Forge Association of General Electric Engineers and Scientists, Philadelphia, Pa.
- Pacific Coast Association of General Electric Engineers & Scientists, San Jose, Calif.
- Utica General Electric Engineers' Association, Utica, N. Y.
- Johnson City General Electric Engineers' Association, Johnson City, N. Y.

* Mr. Hoft is manager, electric power conversion engineering in the General Engineering Laboratory of the General Electric Company in Schenectady, N. Y.

As indicated, the engineers at General Electric have been active in the development of sounding board type roganizations. Approximately 6000 engineers at General Electric in plants throughout the country are members of "sounding board" organizations.

NSPE Policy

By its long standing endorsement of the Kearns "Freedom of Association" legislation and by the policy statement on Engineer Management Communications adopted by the board in June, 1957, NSPE has endorsed sounding board organizations for engineers in industry when such an organization is desired by an engineering group. The Board adopted the following statement in October, 1957:

> "That NSPE recommends to its state societies that they encourage sounding board organizations * in their areas to become functional sections or groups in local chapters of the professional engineering society, consistent with local, state and National Society constitutions. These functional sections or groups may include members who are not registered, but these members shall have no vote in the local, state, or National Society activities except as allowed in the local or state constitutions.

As a result of this forthright encouragement, the Honeywell Engineers' Club did step up to bat and accomplish affiliation, and a number of other groups are now taking steps to follow suit.

Other Affiliations

The Evendale Engineers' Association recently voted to affiliate with the Cincinnati Chapter of the Ohio Society of Professional Engineers. Evendale is the pioneer group in General Electric in this area. The Cincinnati Chapter constitution has been revised to permit affiliation and the "sounding board" constitution has been revised and approved by its membership. The sounding board is now making formal application to become a section in the chapter so that a second affiliation will soon be a reality.

An active "sounding board" is the Schenectady (N.Y.) General Electric Engineers' Association. Shown at a recent meeting of the group are, l.-r.: John Snyder, 1958-59 SGEEA president; Ray Maul, chairman of the General Meetings Committee; Vance Packard, guest speaker, and R. E. Wilson, newly-elected SGEEA president. The author, Mr. Hoft, served as president of the 2,000-member GE group in 1955.

There are some key differences between the Evendale approach and the Honeywell one. The Honeywell affiliation does not provide for a compulsory percentage of sounding board members to be NSPE members or to become members within a fixed time limit. The Evendale plan says that all eligible sounding board members must become registered and full members of NSPE within a certain time (three to five years depending on type of membership). There is, however, a technical or scientific associate member who must have a college degree (other than an engineering degree), but may never become registered. Not more than 15 per cent of the sounding board membership can be of this type.

The Honeywell group affiliated with the Minnesota State Society while the Evendale Sounding Board is planning to become a functional section within the Cincinnati local chapter of the Ohio Society. A number of other General Electric groups are also exploring affiliation; Schenectady and Pittsfield are likely to be the next to accomplish it. Some of the most important reasons given for affiliation include:

Advantages of Affiliation to The Sounding Board

1. Stronger direct voice in national affairs affecting engineers.
2. Higher professional status in the eyes of the public and management, thereby being able to more effectively serve members.
3. Increased breadth of service to members by keeping them informed through nationwide coverage on matters such as employment practices, engineering legislation, and salary surveys.

Advantages of Affiliation to The PE Society

1. Placed in much better position to serve employed engineers in industry in a tangible and professional way at local level.
2. Better able to carry out objectives at all levels because of broader representation.
3. In many cases, a significant increase in membership.

An important advantage to both is considered to be the elimination of duplication of effort providing more concerted action and thus, a positive step toward unity in the profession.

The major accomplishments required to achieve more affiliations in the near future are:

(Continued on page 59)

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* (As presently constituted and as used herein, a sounding board organization is defined as a nonbargaining association of engineers, including those in management, employed by one industrial concern, whose purpose is to improve communications between professional engineering employees and management by serving as an objective fact-finding body and whose activities are carried out in accordance with the professional concepts of NSPE.)

New Literature

AISLES—"Warehouse Layout: Narrow Aisles or Wide?" is the subject of an 8-page brochure published by the Automatic Transportation Company. This brochure is designed as a guide which gives both the advantages and disadvantages to this costly problem in order that material handling engineers might decide which type of warehouse is best for his installation. The history of the narrow aisle-wide aisle problem is discussed along with the changes and advances that have been made through the introduction of new material handling equipment. Four pages of Automatic equipment in operation illustrate how many users are presently solving the narrow-wide aisle problem. One of these illustrations may mean a saving of thousands of dollars to the material handling engineer.

(Circle 15 in Readers' Service Dept.)

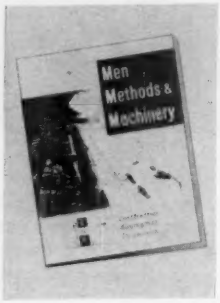
ELECTRIC HOISTS—A complete selection guide for heavy duty electric hoists ranging from ¼-ton to 12-ton capacity is presented in a 34-page catalog available from American Engineering Company. Factors covered by the guide include capacity of hoist, speed and height of lift, dimensions of beam, type of hoist suspension, controls, current supply and operating conditions. The catalog also contains dimensional drawings and detailed specifications for the American Engineering line of Lo-Hed electric hoists.

(Circle 16 in Readers' Service Dept.)

CONCRETE—A booklet describing a machine that is said to bring "an entirely new concept to concrete finishing" is now available from the Goldblatt Tool Company. The booklet describes in detail how this new tool tamps a slab without requiring the workman to "wade in the mix" or "pound a low slump mix to death." The booklet explains why the machine is said to speed concrete finishing time, eliminate back-breaking labor, make impossible jobs easy and radically reduce concrete finishing costs.

(Circle 17 in Readers' Service Dept.)

CONSTRUCTION—Engineers, architects, public officials, industrial builders—anyone concerned with soil mechanics, earthmoving, land reclamation and general construction will find information of interest in "Men,



Methods, & Machinery," published by Construction Aggregates Corporation. The 52-page brochure describes a number of engineering "firsts," including many pictorial case histories showing methods of operation and equipment used on some of the most challenging and unusual projects of their kind ever undertaken. It covers many unique projects involving land reclamation and stabilization; hydraulic stripping and dredging; site preparation for industrial plants, highways and airports; channel and port development; ship salvaging, and sand and gravel production.

(Circle 18 in Readers' Service Dept.)

FILTER MEDIA—Literature prepared by Purolator Products, Inc., guides the selection of proper engineering materials and filter media for given types of corrosive conditions. Prepared in booklet form, the chart lists, filter media for varying concentrations of more than 125 corrosive agents. Primarily, the chart narrows down the choice of filter materials and Purolator recommends the booklet as a basic reference source. The booklet—designated PUR-66D—lists corrosive agents varying from acetic acid to zinc chloride; concentration percentages; temperatures; and filter media of metallic, plastic, or "other type" design.

(Circle 19 in Readers' Service Dept.)

TEST APPARATUS—Soiltest, Inc., has published a new 4-page bulletin on consolidation test apparatus which the company is offering to engineers, builders, contractors, and testing laboratories. Consolidation tests, a vital function in large construction jobs, are used to predict the time settlement characteristics of the foundation under a building, dam, bridge, or similar structure. Only a small soil sample is needed for conducting the test. The bulletin describes the various types of loading devices used for consolidation testing. Included in the booklet is a description of a new table model consolidation test device called the Levermatic, which applies a load of twenty tons per square foot on a 2½-inch diameter specimen. Accessories such as specimen trimmers, loading weights, porous stones, and data sheets are also described and illustrated in the bulletin. Other "Stream-Liner" construction features illustrated and described in the booklet include a standard mast assembly that provides 25½" of free lift and an oversize positive-action hydraulic pump that provides faster, smoother lifting action.

(Circle 20 in Readers' Service Dept.)

LIFT TRUCKS—Advantages claimed in a 24-page booklet entitled "What Makes It Tick?"—released by Towmotor Corporation—are increased operating efficiency, greater driver comfort, and improved handling ease provided by a new "Stream-Liner" series of fork lift trucks produced by the company. Among the design features incorporated into the lift truck models are a new lowered cowl which gives the operator full vision to the forks, on either side; a new "direct view" instrument panel, and a new treadle-type accelerator that cuts driver fatigue. According to Towmotor engineers, all operating controls on the newly styled "Stream-Liner" series simulate those used on motor cars—to simplify operator training and use, keep hand and arm motion to a minimum. Now "Stream-Liner" Series Lift Trucks are available in eight different gasoline, diesel, or LP-Gas-powered models, with lifting capacities ranging from 2000 to 4000 lbs.

(Circle 21 in Readers' Service Dept.)

These listings are informational only and are not an endorsement of the products, nor of the manufacturer's claims. To receive any of the new literature described in this column, merely circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

NSPE Fall Meeting Scheduled For Pittsburgh, Oct. 15-17

- Student Chapter to Receive Charter
- Three-Day Program is Announced

The first NSPE charter to a student chapter will be presented to the University of Pittsburgh during the fall meeting of the Society, October 15-17, in Pittsburgh, Pa. The presentation will be made at the opening dinner.

Most of the time scheduled on the three-day program has been allotted to committee reports, beginning on Friday morning, October 16. Registration is set for 10 a.m. Thursday at the Penn-Sheraton Hotel—meeting headquarters.

Harold A. Mosher, National Society president, will speak on "The Challenges for the Society in 1960" at the Thursday dinner.

Preceding the official opening of the fall session, the Executive Committee will convene October 14-15.

A number of social events have also been planned for both members and their wives by the host Pittsburgh Chapter. William H. Parish is serving as general chairman for the get-together.

The complete program follows:

WEDNESDAY—OCTOBER 14, 1959

9:00 a.m.—5:00 p.m. Executive Committee Meeting.....Park View Room

THURSDAY—OCTOBER 15, 1959

9:00 a.m.—5:00 p.m. Executive Committee Meeting.....Park View Room

Registration will commence at 10:00 a.m., Thursday, October 15, at the entrance to the Pittsburgh Room. It will continue to approximately 5:00 p.m., Friday, October 16.

6:15 p.m. Social Hour....Pittsburgh Room

7:15 p.m. Opening Dinner—Everyone invited.....Pittsburgh Room

"The Challenges for the Society in 1960"
Harold A. Mosher, P.E., NSPE president
Presentation of Charter to Student Chapter of the University of Pittsburgh

Evening Session, October 15, Following Dinner

Roll Call of Members of the Board
Reading of Minutes of Previous Meeting
Reading of Communications
Petitions of New State Societies
Report of Officers
Report of Executive Committee

FRIDAY—OCTOBER 16, 1959

9:00 a.m. Professional Meetings.....Pittsburgh Room

Professional Development Group — Vice President Hull, presiding

Current Status of Revised Model Law
Robert Williamson, P.E., Chairman, Registration Committee
Expanding the NSPE Scholarship Program
Leland Hobson, P.E., Chairman, Scholarship Committee
Plans for Young Engineers' Month
Arthur Gompf, P.E., Chairman, Young Engineers Committee
Report on First Year's Activity of the Student Chapter Program
J. Neils Thompson, P.E., Chairman, Student Chapter Committee

Professional Employment Group — Vice President Easley, presiding

Ethical Studies
Marcus Durlach, Jr., P.E., Chairman, Ethical Practices Committee
Functional Section Activities for Engineers in Government
Task Force Studies on State Merit Programs
New York City Unionization Move
Separate Professional Schedule for Federal Employees
Promotion of Registration
Wesley E. Gilbertson, P.E., Chairman, Functional Section for Engineers in Government
Functional Section Activities for Consulting Engineers in Private Practice
Meeting the Congressional Attack on Consultants
Inauguration of Private Practice News
Communications to Consulting Firms and Individuals
Alfred H. Samborn, P.E., Chairman, Functional Section for Consulting Engineers in Private Practice
Case Opinions on Advertising and Competitive Bidding
Murray A. Wilson, P.E., Chairman, Board of Ethical Review
Engineer in Industry Programs
Chapter Meetings on Western Electric Case
NSPE Industrial Award
Congressional Action on PE's in Construction Industry
Interim Professional Development Course Material

Members of the Fall Meeting Committee shown at a recent session are, l. r., (standing) William H. Wachter, president of the Pittsburgh Chapter; W. J. Parish, general chairman; (seated) William L. Donovan, NSPE national director, and Donald M. McNeil, immediate past president of the Pittsburgh Chapter.

This will be a sight many Society members will view as they prepare to land at the Greater Pittsburgh Airport.

Harry P. Cooper, P.E., Chairman, Engineers-in-Industry Subcommittee

12:15 p.m.—Regional Luncheons

Afternoon Session—2:00 p.m.

Professional Relations Group—Vice President Zelhart, presiding

Plans for Survey of Membership on Elements of Organizing the Engineering Profession
Garvin H. Dyer, P.E., Chairman, Inter-Society Relations Committee

Relations with Architects
James P. O'Donnell, P.E., Chairman, Interprofessional Relations Committee

Public Relations Group—Vice President Rouse, presiding

New Public Relations Program
Monthly Public Relations Newsletter
Using the PR Manual Effectively
John L. Pratt, P.E., Chairman, Public Relations Committee

Preparation for Engineers' Week—1960
Belton Y. Cooper, P.E., Chairman, Engineers' Week Committee

Organizational Functions Group — Vice President Backlund, presiding

Plans for 1960 Operation—American Engineer
G. Ross Henninger, P.E., Chairman, American Engineer Committee

Engineering Technicians' Program
Consideration of an NSPE Policy on Registration for Technicians
Consideration of an NSPE Policy Regarding Cooperation with Technical Institute Programs
A. C. Friel, P.E., Chairman, Committee on Engineering Technicians

Membership Growth
Thomas T. Mann, P.E., Chairman, Membership Committee

New Revised Chapter Handbook
Frank W. Edwards, P.E., Chairman, State Society and Chapter Activities Committee

6:15 p.m.—Social Hour...Pittsburgh Room

7:15 p.m.—Banquet.....Pittsburgh Room

Entertainment

SATURDAY—OCTOBER 17, 1959

Morning Session—9:00 a.m...Urban Room

Policy Operations Group—Vice President Christian, presiding

Revisions to the 1959 Budget
Adoption of the 1960 Budget
W. Earl Christian, P.E., Chairman, Budget Committee

Professional and Administrative Policies Review
C. G. Roush, P.E., Chairman, Policy Review Committee

Report of Constitution and Bylaws Committee
Lehmann M. Dunn, P.E., Chairman, Constitution and Bylaws Committee

Resolutions
James A. Evans, P.E., Chairman, Resolutions Committee

NEW BUSINESS

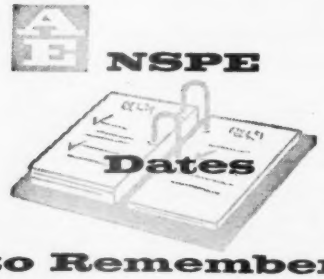
ADJOURNMENT

1960 Engineers' Week Theme Is Announced

"Engineering's Great Challenge —The 1960's" has been selected as the theme for the 1960 National Engineers' Week, February 21-27.

Announcement of the theme was made by Belton Y. Cooper, newly appointed National Engineers' Week chairman. Mr. Cooper, of Birmingham, Ala., was named in July by NSPE President Harold Mosher to succeed retiring Chairman John L. Bahr, of West Chester, Pa. Mr. Bahr served as chairman of the Week for the past three years.

Chairman Cooper pointed out that the 1960 theme was chosen "as a part of a broad program to bring home to our young people the importance of obtaining the



to Remember

Wisconsin Society of Professional Engineers—Summer Meeting, September 18-20, 1959, Dellview Hotel, Lake Delton, Wisconsin.

Indiana Society of Professional Engineers—Chapter Officers' Conference, September 26, Washington Hotel, Indianapolis, Indiana.

West Virginia Society of Professional Engineers—Annual Meeting, October 8-10, 1959, Oglebay State Park, Wheeling, West Virginia.

National Society of Professional Engineers—Fall Meeting, October 15-17, 1959, Penn-Sheraton Hotel, Pittsburgh, Pennsylvania.

Washington Society of Professional Engineers—Annual Meeting, November 6-7, 1959, Winthrop Hotel, Tacoma, Washington.

Professional Engineers of Oregon—Annual Meeting, November 13-14, 1959, Benson Hotel, Portland, Oregon.

Arkansas Society of Professional Engineers — Annual Meeting, November 27, 1959, Marion Hotel, Little Rock, Arkansas.

Puerto Rico Society of Professional Engineers—Annual Meeting, November, 1959, Building of the Colegio de Ingenieros, Hato Rey, Puerto Rico.

National Society of Professional Engineers—Winter Meeting, February 18-20, 1960, Broadview Hotel, Wichita, Kansas.

Pittsburgh at Night

A night photograph catches Pittsburgh—site of NSPE's fall meeting—all aglow.

kind of sound and comprehensive academic background that will enable them to participate fully in the outpouring of scientific and technological creativeness expected during the coming decade."

Promotional material being prepared for the Week by the National Society will emphasize the role of the engineer in contributing to progress during the decade of the 1960's in the exploration of our solar system, electronics, medical research, transportation networks, building structures, and many other fields. The 1960 theme will be the basis for newspaper articles, speeches, and radio and TV announcements, and it will be used in career conferences for high school juniors and seniors, and exhibits on engineering achievements.

A number of leading engineers are once again being asked to lend their names as sponsors of the Week. The complete list of 1960 sponsors will be published in the October issue of the AMERICAN ENGINEER.

Promotional kits prepared by the National Society will be sent to all NSPE affiliates early in October. The kits will contain sections devoted to suggestions for developing a basic Engineers' Week program at the chapter level. The suggestions cover newspaper publicity, radio and TV public service time, exhibits, and ideas for a variety of special projects. One section in the kit will contain a 20-minute talk based on the 1960 theme for the Week.

Promotional aids such as a set of 1-minute TV films, tape recordings for radio programs, posters, banners, logotypes, newspaper mat stories, lapel buttons, and gummed seals will be available from the National Society headquarters office. Order blanks describing these promotional aids and listing prices will be sent to all local chapters and state societies. A series of "Action Letters" will be mailed from the National Society to keep local Engineers' Week committee chairmen informed as to the promotional material being offered.

Thoughts on Professionalism...

By PAUL H. ROBBINS, P.E.
NSPE Executive Director

Engineering as a Part of Science

MANY in the engineering profession have been concerned with the recent trend of editors, newspapermen, and some speakers to use the generic term of science in referring to many aspects of our technological effort. While admittedly the line of demarcation between basic science and the applied science usually thought to be in the realm of engineering is becoming less and less distinct, it is of concern to the engineering profession that the need for applying scientific principles to the problems of our modern economy seems to be receiving less interest.

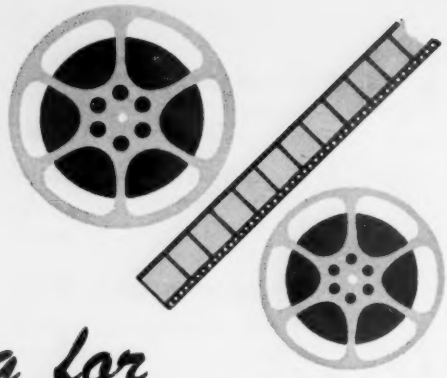
THE Committee on Science and Astronautics of the House of Representatives recently approved a bill to establish a National Medal of Science. As pointed out in some of the testimony, the basic objective of this legislation should it be passed is threefold: (1) To encourage scientific and engineering activity; (2) to encourage individuals, particularly young people, to enter the educational disciplines of science and engineering; and (3) To focus public attention upon the need and dependence of the growth of our county on our technological effort.

MUCH of the testimony referred primarily to encouraging basic scientific research. It was disturbing to note a failure to realize that the greater majority of our technological advances are made possible through the engineering effort of taking basic scientific facts and applying them to products, procedures, and systems which make practical space vehicles, modern military weapons, mass production techniques, and many of the necessities of life we have come to enjoy. References were frequently made to eminent individuals in the fields of basic research, failing to recognize the equally-important contributions made by engineers in applying these basic principles.

THE suggestion was made to the Committee that it would be well for this National Medal to be considered a Medal of Science and Engineering. Perhaps the strongest justification for this recommendation was the third objective of the legislation; namely, to focus attention on the individuals who contribute to our basic scientific effort. Obviously the nation needs well-qualified engineers. Unless engineers receive recognition for their important role in the scientific effort of the nation, neither the nation nor the profession can expect to attract the caliber of young men who will be able to contribute the engineering thought needed for the future expansion and defense of our country.

IT IS encouraging to note the action of the Committee in reporting this bill out to the full House. It is to be hoped that the Congress will see fit to create this national recognition of scientific effort. It is further to be hoped, however, that the President in selecting individuals to receive this award will recognize the importance of engineering contributions and designate a proportionate number of the awards to be given to outstanding individuals in the engineering profession.

NSPE Presents:



"Building for Professional Growth"

Here is a film covering the activities of the National Society of Professional Engineers at the chapter, state, and national levels. A milestone in the NSPE public relations program, "Building for Professional Growth" is a filmed presentation on the values and benefits of Society membership. Activities covered in the film include NSPE efforts in registration; research projects such as the Income and Salary Survey, the Professional Engineers Conference Board for Industry reports; legislative cooperation; National Engineers' Week, and other programs. Also included are scenes from actual chapter, state, and national level meetings.

"Building for Professional Growth" can be shown on any 16mm sound projector. Reservation requests should be made for three choices of dates. Notification of available date will be sent from NSPE headquarters immediately after each reservation request is received.

RENTAL FEE: $10

(Includes 8-page booklet "Ideas For Your NSPE Film Program," and 15-minute talk on NSPE.)

Use this coupon to reserve your film

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS
2029 K St., N.W. • Washington 6, D. C.

Please reserve us the NSPE film "Building for Professional Growth" for the following choice of dates:

_____ (*1st*) _____ (*2nd*) _____ (*3rd*)

SHIP TO:

Name_____

Street_____

City_____ Postal Zone_____ State_____

(Make checks payable to National Society of Professional Engineers)

ETHICS

(Continued from page 51)

of the problem whether a man leaves the employ of the Government to open his own consulting office or whether he goes to work on a salary for a consulting engineer; it tends to bring dishonor to the profession of engineering if the man devotes his energies, while still employed, to promote his future practice or employment on the basis of having inside information which would lead to greater profits, if he can secure a position or enter into contract to work on further details of the identical project.

In the hope of deterring and ultimately eliminating such practices, the Board proposes the following rule to supplement Section 27 of the Canons:

"He will not enter into promotional efforts or negotiations for work or make arrangements for other employment as a principal or to practice in connection with a specific project for which he has gained particular and specialized knowledge while in such employment."

Respectfully submitted,

BOARD OF ETHICAL REVIEW
Pierce G. Ellis, P.E.
Wylie W. Gillespie, P.E.
Orland C. Meyer, P.E.
Murray A. Wilson, P.E., Chairman
Members Not Voting:
Marvin C. Nichols, P.E.
William F. Ryan, P.E.
Member Dissenting:
Ezra K. Nicholson, P.E.

Dissenting Opinion

The wording of certain Canons is somewhat like the oracle. The spirit, or intent, of the Canons varies with people and the situations in which they find themselves.

The next to last paragraph of the introduction to "Ethics for Engineers" states, "An expression heard frequently is, 'The intent of this section of the Canons is . . .'" The guiding principle behind the phrasing of the "Rules" is that the words mean exactly what they say—that there is no concealed, hidden, or obscure "intent."

In my opinion the "Conclusion" of the report should be, "The Board believes that the men in

question have not violated the Canons or Rules as they currently exist."

This could be followed by a "Recommendation" that the Ethical Practices Committee be instructed to consider the desirability of adding another Rule under Section 27 of the Canons to make unethical a situation similar to the one considered, as well as for a situation where the employees were other than Government.

I foresee difficulties with the additional Rule proposed in the report for employees other than Government, and I would prefer that the development of a Rule for this complicated situation be assigned to the Ethical Practices Committee which has the responsibility for developing rules for ethical conduct.

Ezra K. Nicholson, P.E.

Action on Case by NSPE Board of Directors:

Moved and seconded that the report on case 58-1 of the Board of Ethical Review be received and that the matter of preparing and submitting a rule to more adequately cover the situation be referred to the Ethical Practices Committee.

SOUNDING BOARDS

(Continued from page 52)

- Persuading all engineers in industry to become a part of the professional society.
- Working out membership arrangements suitable to the sounding board member and the professional Society—General Electric groups are requiring individual members to become licensed after a certain time or forfeit their membership, and licensed members to become full NSPE members if they wish to be members of the sounding board.
- Solving the problem of the role of the scientists (persons with other than engineering degrees who in some cases may never be able to become licensed) in the professional Society.

It is difficult to prepare a general plan for accomplishing affiliation, but the NSPE Engineers-in-Industry Subcommittee does believe these concepts should generally be followed:

- The organizational technique to accomplish affiliation will be a function of the particular local situation. In Minneapolis, it was logical for the sounding board to become a part of the state society since the Honeywell membership overlapped a number of NSPE local chapter boundaries. In most of the General Electric groups, the sounding board should probably be a functional section within the NSPE local chapter since the sounding board membership is all within the jurisdiction of one NSPE chapter.
- Consistent with the local, state, and national PE society constitution, when affiliation is accomplished, provisions should be made to include the entire professional membership of the sounding board organization in the local functional section or group of the professional society. For example, a licensed member of a sounding board should generally at least be given a reasonable time after affiliation to become a full member of the professional society. In addition, again consistent with all society constitutions, professional members whose educational backgrounds may not permit them to become licensed, should not be forced to resign from the sounding board after it is affiliated with the professional society.
- In all cases, when affiliation is contemplated, an extensive campaign to sell professionalism to the engineer-in-industry and persuade engineers to become members of the professional society must be planned and executed since this is our most important continuing critical task in the professional society.

The Honeywell Engineers' Club in Minneapolis has accomplished a significant step toward professionalism for the engineer-in-industry. It appears that a number of other sounding boards will follow this lead in the near future and become a part of NSPE. This is a significant turning point in the history of the engineer-in-industry program of NSPE and continued steps to affiliate sounding board type organizations with NSPE will place the Society in an excellent position to serve engineers in a tangible and professional way at the local level.—End.

CLASSIFIED ADVERTISING

Minimum 3 lines.
Undisplayed, $1.80 per line. Three or more consecutive insertions $1.50 per line each.
Displayed: Same rate as General Advertising.
Positions Wanted: Undisplayed, 90¢ per line. Three or more consecutive insertions 75¢ per line each. Displayed: General Advertising rates, less 50%.
Box Number chargeable as one line.

Mail Box Number replies to:
AMERICAN ENGINEER
2029 K Street, N.W. Washington 6, D.C.

Positions Wanted

Sales Engineering Representative P. E. Box 900, AMERICAN ENGINEER.

Positions Available

Wanted: Engineering Draftsman. $4560-$5520. (depending on background) Sewers-Streets experience. Apply to Personnel Director, City of West Palm Beach, Florida, P. O. Box 1431.

Miscellaneous

Talbots Railway Transition Spiral, Rev. and Enlarged by E. H. Roth, Ret., Div. Engr., N. & W. Ry., 915 Sixth Street, Charleston 2, W. Va. Price $5.00. Postpaid.

Interested in the State of Hawaii? If you want to be placed on our continuous mailing list, we will mail to you monthly a "Review of Business and Economic Conditions in Hawaii." Also, catalogues, listing of new products, business and job opportunities and a general mailing and information service. We also act as your agent in Hawaii. To be registered send $5 check or money order to: Crafts of Hawaii, Inc., Direct Mail Department—LH, 1145 Bishop Street, Honolulu 13, Hawaii.

WANTED

Consulting engineering firm with architectural, industrial and government clientele, to consider expansion by merger with our New York branch of similar organization, doing a substantial practice in mechanical, electrical, structural and sanitary design for structures throughout the country and overseas. Objective — to increase scope of activities of N. Y. office by combining skills and resources. Strong design, management & sales personnel a definite requirement. Alternative — would consider for partnership a REGISTERED ENGINEER who is prepared to invest, has extensive management and design experience, and is in a position to attract qualified engineering personnel and new business. State full qualifications in first letter.

Box 901, AMERICAN ENGINEER

By Mrs. Garvin H. Dyer, Chairman of the Ladies Auxiliary Advisory Committee.

For the first time, the Advisory Committee was invited to give a report to the NSPE Board at its annual meeting in New York.

Because we feel this report gives a fairly complete, brief picture of auxiliaries to date, we believe you will be interested in reading portions of the report which follow:

"In March, 1951, when a committee was appointed by NSPE President Stolte to make a thorough study of auxiliaries, there were nine auxiliaries. This committee, headed by John D. Coleman, made its first report in June, 1951, at the annual meeting in Minneapolis, and by this time there were twelve.

"Since that time, and with the approval and encouragement of NSPE, there has been a steady growth.

"At the present time there are 113 auxiliaries, five of these being on a state level, the other 108 on a chapter level. This number will probably increase before the end of the year on June 30, as there are more auxiliaries being formed at this time.

"No record of the number of members is available for prior years. However, this year on the questionnaire which is sent out each spring for information regarding the auxiliaries, we asked for the number of charter members and for the present membership. It was interesting to note that not a single auxiliary has lost in membership; a very large majority has shown phenomenal growth.

"Due to late mailing, only fifty-one questionnaires have been received out of 113, but these fifty-one auxiliaries have a combined membership of 3,498. A fair estimate of our total membership should be well over 5,000."

Reports of our chairmen were presented. These will be published in full in Engineers Wives. At the end of the business session a very worthwhile question and answer period was held which was a great benefit to every woman attending.

The following officers of the Ladies Auxiliary Advisory Committee were elected for 1959-60:

Mrs. Garvin H. Dyer, chairman, 10011 East 36th St., Independence, Mo.

Area Chairmen – Northeastern: Mrs. Henry Vermont, 81 Metropolitan Oval, Bronx 62, N.Y.

Southeastern: Mrs. Marcus R. Durlach, Jr., 6025 Lakeshore Drive, Columbia, S.C.

Central: Mrs. K. N. Wilkens, 1134 Wall, Port Huron, Mich.

North Central: Mrs. Arlow V. Ferry, 6329 Walrond St., Kansas City 30, Mo.

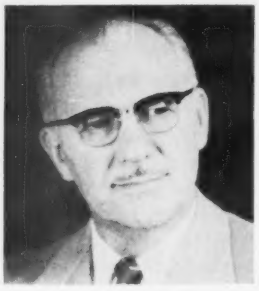
Southwestern: Mrs. Clark Dunn, 317 North Husband, Stillwater, Okla., and

Western: Mrs. George E. Zelhart, 2007 Farris, Fresno, Calif.

National Director Tews Dies in Minnesota

Arthur W. Tews, a national director of NSPE, died recently of a heart attack at his home in St. Paul, Minn.

A native of Hutchinson, Minn.,



Arthur W. Tews

Mr. Tews was chief engineer for the City of St. Paul. He formerly served as city engineer of Duluth for ten years.

Mr. Tews, 57, had been active in professional societies for the past twenty years, and was a former president of the Minnesota SPE. He was graduated from the University of Minnesota.

His survivors include his wife, Opal, a son, Thomas, and a daughter, Mrs. Richard C. Johnson.

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D own through the vista of receding years
O ne sees a youth whose keen creative bent
C arried him ever on to new frontiers
T ugging unceasingly toward accomplishment.
O ften harsh trials would his path befall:
R ugged the climb, but still he persevered,

S teadfastly prompt at his profession's call
T oward final triumph; by the world revered.
E ver an artist as he built each span
I n the exalted manner of the past;
N ever found lagging: always in the van;
M aster in building bridges that shall last.
A s we salute his genius, we acclaim
N o less the artistry which has brought him fame!

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Then if you want more information about any item, simply circle the corresponding number on the form, sign, fold, fasten and MAIL TODAY!

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Please have information sent to me on items circled below: **September**

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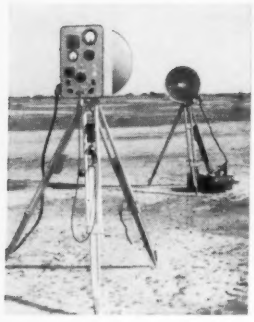
Progress in Products

SURVEYING EQUIPMENT — Item 30

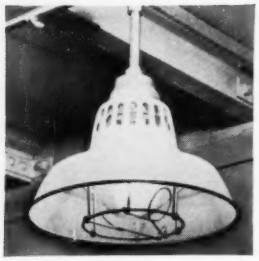


Technical innovations in unique two-station electronic surveying equipment are being offered in a system called the Micro-Dist, introduced by Cubic Corporation. Using micro-wave techniques already proven in the surveying field, the Micro-Dist reduces distance-measuring time to a new low, according to its developers, with new features claimed to increase accuracy, permit operation under a wider range of weather conditions on an around-the-clock basis, provide easier and faster interpolation of data, and introduce new operating ease. Interchangeability of stations is one of the most unusual features designed into the Micro-Dist, which operates on the interrogator-responder principle but without the requirement of a Master-Slave station setup. Either of two stations can be operated as interrogator or responder merely by throwing a switch.

SPRAY PAINTING — Item 31

Introduction of airless spray painting equipment has been announced by The DeVilbiss Company. This method of "airless atomization" of paint and other materials opens new avenues of spray applications, according to the manufacturer. An example of a typical application is the spray painting of heavy machinery, interior structures and other surfaces where exhaust facilities for the removal of vapors and overspray are either very limited or nonexistent. On exterior painting, the airless method permits rapid coverage with extremely wide spray patterns without creating excessive mist and rebound, it is claimed.

INDUSTRIAL LIGHTING — Item 33



Improved light distribution is claimed in Crouse-Hinds new slotted reflectors, now available for both explosion-proof and vaportight Condulet lighting fixtures. Slotted reflectors eliminate harsh brightness contrast, improving visibility and seeing comfort. Worker fatigue, and accidents resulting from it, are reduced, while production increases, the manufacturer says.

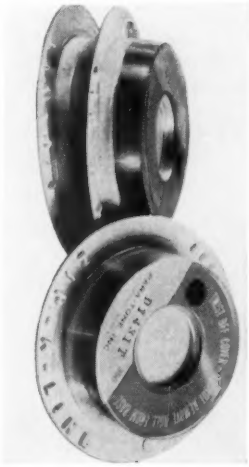
DRAWING DESKS — Item 32

A high-style walnut drawing desk, "The Landmark," has been developed by Hamilton Manufacturing Co. Unusual feature of the new unit is an attached side auxiliary unit which offers convenient tool, catalog and tracing storage and a space-saving working area just a quarter-turn from the desk. The auxiliary unit principle is based on studies showing a high correlation between nearness of working tools and materials and productivity.

DIAZO PAPERS — Item 34

Two new semi-moist diazo papers that are said to provide high quality, dense line images at machine speeds far faster than previously possible have been introduced by Keuffel &Esser Co. Called Onyx 5 and Onyx 8, the new papers are claimed to be the first major developments in the moist diazo process field in fifteen years. In addition to high-speed production capabilities the new Onyx formulation is said to provide sharp contrast. Although both papers utilize the same chemistry, Onyx 5 is designed as a general purpose paper.

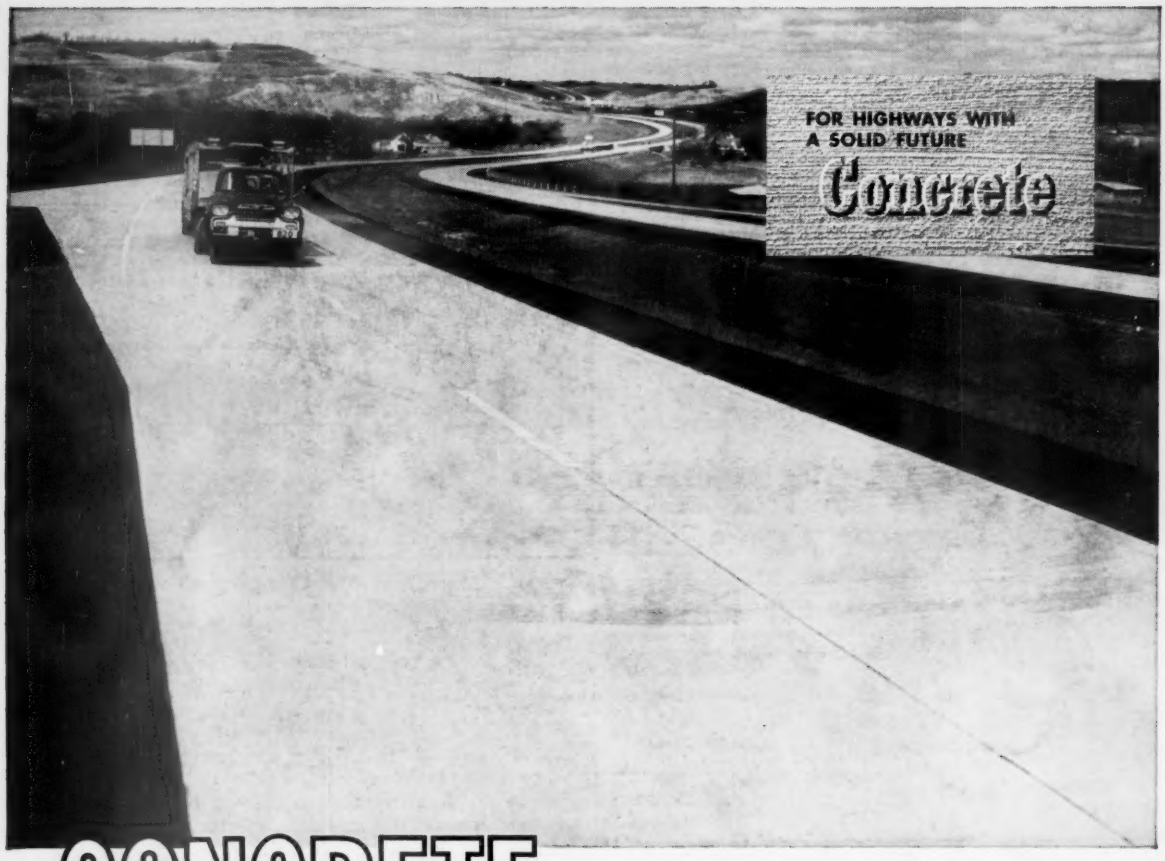
ZIP-A-LINE TAPES — Item 35



Designed to eliminate tedious line work on charts, layouts, graphs and other visual presentations, self-sticking ZIP-A-LINE tapes featuring a self-dispensing package for easy handling and long-life storage have been announced. The tape unwinds from plastic reel base which may be conveniently stacked or hung nearby. Air-tight, transparent plastic cover permits easy color selection and provides maximum protection for the product. Available in seventeen solid and patterned colors, ZIP-A-LINE tapes are flexible for curved or straight line work. They are offered in a variety of widths from 1/64 to 2″ on rolls of 360″ and 650″. The tapes are shrink-resistant and are said to maintain original colors indefinitely.

This column describes new products of general interest to professional engineers. For further information, circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

These listings are informational and are not an endorsement of the products, nor of the manufacturer's claims.



CONCRETE will save taxpayers $2,835,000 on the first 39 miles of North Dakota's Interstate 94!

North Dakota chose concrete to get the big savings where they count most—on upkeep

On the 39-mile stretch between Jamestown and Valley City—and for other sections of the Interstate System—North Dakota had good reasons for choosing concrete. *Concrete means tax savings and real dollar value.*

In North Dakota it was found that by comparing amortized first costs plus surface maintenance costs for concrete and asphalt, *concrete will save $72,200 per mile in 35 years.*

Estimates were based on maintenance costs shown in an official study of pavements in 28 reporting states. And because the asphalt design being considered would require two resurfacings, this cost was figured in, too. Bureau of Public Roads life expectancy studies gave the schedule for such resurfacings. Final figures evidenced impressively the sizable year-after-year savings provided by concrete!

The reasons are simple enough! Concrete needs no special seal coatings, no periodic resurfacings—both costly items. There's far less routine maintenance, too.

Concrete is nonflexible . . . it has *beam* strength it never loses. In fact, concrete grows stronger year by year. Modern, air-entrained concrete gives built-in protection against damage caused by freezing and thawing.

Concrete highways 35 years old are a matter of record. Today's modern concrete promises 50 years and more of smooth going for drivers. Thrifty concrete on the Interstate System leaves more funds for other highways. Concrete means true economy for taxpayers, both today and in the future. It's easy to see why concrete is the preferred pavement for important highways.

PORTLAND CEMENT ASSOCIATION

A national organization to improve and extend the uses of concrete

(Circle 11 in Readers' Service Dept.)